

**Effects of Ambient Light on Gill Net Catches of Coho and
Chum Salmon in Experimental Fishing in Clarence Strait,
Alaska**

by

Brian L. Lynch

September 1991

Fishery Research Bulletin

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September 1991

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**Alaska Department of Fish and Game
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ABSTRACT

Experimental gill net fishing was conducted in upper Clarence Strait in the fall of 1988 and 1989. The objective was to compare the catch per unit effort (CPUE) of coho and chum salmon between gill net sets made during three phases of ambient light: daylight, twilight, and darkness. I specifically wanted to determine if diel gill net closures could be used as an effective management tool to minimize catches of one species while maintaining fisheries for other salmon species. Gill nets were operated in a manner that reasonably approximated their use in commercial fisheries. Results of non-parametric analysis of variance tests were used. For coho salmon I found no statistically significant differences in CPUE between the different phases of ambient light during either year. For chum salmon the 1989 and pooled 1988-89 data sets produced significant differences in CPUE for the different phases of ambient light. Thus, diel management implications for coho salmon appear to be modest, but for chum salmon, night fishing could conserve this species when its abundance is low compared to that of commingled coho salmon.

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INTRODUCTION

Coho salmon *Oncorhynchus kisutch* conservation is a subject of increasing concern in Southeast Alaska fisheries management due to decreased abundance in recent years. In the fall, coho salmon often occur in mixed stock drift gill net fisheries in lower concentrations than chum salmon *O. keta*. In years when the coho run is weak, the conservation of coho salmon in these fisheries has been a concern. Consequently, ways to minimize their harvest in these mixed stock gill net fisheries have received considerable attention. Observations by fishermen suggested that coho salmon may be more susceptible to capture at night. This study was conducted to examine the possibility of using light-specific gill net closures as a management tool to reduce catches of coho salmon in mixed stock fisheries.

Upper Clarence Strait was selected to test this possibility in the hope that results could be applied to other gill net fisheries as well. Experimental fishing using drift gill net gear was conducted during the fall of 1988 and 1989 to determine whether ambient light affected catch rates or catch per unit effort (CPUE) of coho and chum salmon. Drift gill net sets were made during daylight, twilight, and dark hours were compared to determine if diel gill net closures could be used as an effective management tool to minimize catches of one species while still maintaining fisheries for other salmon species. This tool would be especially useful during periods of low coho salmon abundance coinciding with average or above average chum salmon abundance.

In the fall the majority of commercial driftnet fishing in Clarence and Sumner Straits (District 6) occurs near Macnamara Point, Point Colpoys, Kashevarof Passage, and Marsh Island (Figure 1). At this time of year, the bulk of the fishing takes place during daylight hours because the nets need to be observed; the nets are set perpendicular to the shore so that they are often crowding the beach on the onshore end throughout the drift. Night fishing is difficult because fisherman generally are unable to visually observe their nets in the dark, and tidal action, weather, and debris can combine to make night fishing extremely hazardous. In spite of this, if coho salmon

were caught less efficiently at night, then night-only fishing could be used when coho stocks are weak.

METHODS

Initial results from 1988 (Lynch 1991) were inconclusive due to the low number of sets taken in darkness compared to daylight. Sampling in 1989 was designed to increase the number of night sets.

Sampling Methods

Experimental fishing was conducted from Southeast Alaska commercial gill net vessels; in 1988 from the *F/V Fairhaven* and in 1989 from the *F/V Spirit*. Both vessels were 35 feet long. Fishing occurred along the west coast of Etolin Island at Marsh Island (Figure 1) during a 4-week period between August 24 and September 16, 1988 and during a 5-week period between August 17 and September 15, 1989. In both years we used standard 6.25-in stretched-mesh commercial gill nets, 300 fathoms in length. Mono-twist with center core web was used in 1988; six-strand monofilament webbing 60 meshes deep was used in 1989. Muir and Alexandersdottir (1987) showed that differences in CPUE between center core mono and six-strand mono web were negligible in clear water. Both onshore and offshore locations were fished in 1988. In 1989 only the onshore fishing location was used because the 1988 experimental fishery demonstrated no significant differences in CPUE between onshore and offshore locations (Lynch 1991).

An attempt was made to keep the duration of each set near 2 h in 1988 and 1 h in 1989. The 1-h sets in 1989 were used to maximize the number of sets made while still allowing enough time for fish to encounter the net. The entire net was used during each set. In 1988 the sets averaged 1.9 h and ranged from 0.48 h to 3.16 h; in 1989 the sets averaged 1.05 h and ranged from 0.43 h to 1.61 h. The actual duration of each set depended upon its proximity to shore, drift speed and direction, the amount of debris present, and water and wind conditions. Fishing time (T) in hours was calcu-

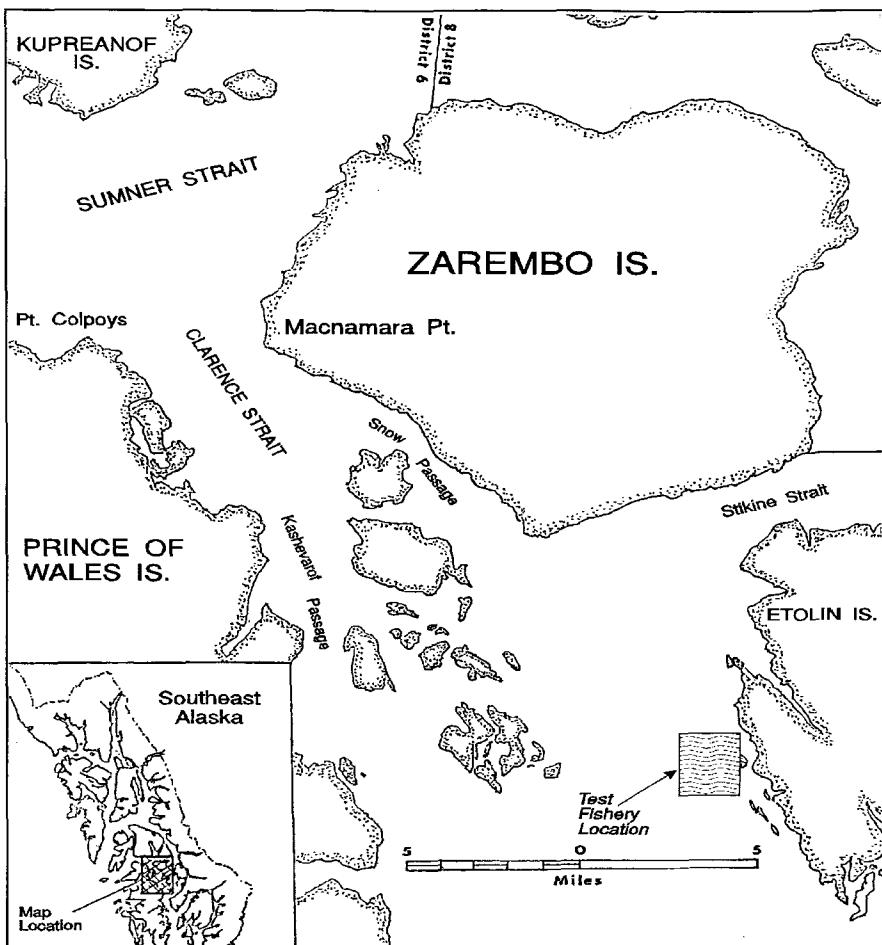


FIGURE 1.—Map of Sumner and upper Clarence Strait showing the 1988 and 1989 experimental fishing locations.

lated using the standard formula employed in Bristol Bay "test" fisheries (Van Alen 1981):

$$T = (IN_s - OUT_f) + 1/2 [(OUT_f - OUT_s) + (IN_f - IN_s)]$$

where:

OUT_s = the time at the beginning of the set,

OUT_f = the time at which the net was fully set,

IN_s = the time at the beginning of net retrieval, and

IN_f = the time at which the net was fully retrieved onboard the vessel.

For each set the catch of each species was divided by the fishing time to obtain the CPUE.

The gill net sets were classified by three phases of ambient light: twilight, full daylight, and full dark-

ness. *Twilight* was the period between sunset and evening astronomical twilight, *daylight* was the period between sunrise and sunset, and *darkness* was the period between evening astronomical twilight and morning astronomical twilight. The times for sunrise, sunset, and astronomical twilight were obtained from standard nautical tables (USNO 1987, 1988). In 1988 the sets were classified based on the time that net retrieval began. In 1989 the gill net sets were all completed entirely within the particular light phase, whereas in 1988 sets occasionally overlapped into the next light phase. Data recorded for each set included the date, set number, fishing times, catch by species, weather conditions, and tidal stage.

Sets were made during all tidal stages within each light phase to randomize any effects the tides might have on CPUE. Weather and wave conditions were

noted but not included in the analysis because of the difficulties in quantifying these effects.

Analytical Methods

To test for differences in CPUE between the three ambient light phases the Kruskal-Wallis test, a non-parametric ANOVA based on ranking (Zar 1984), was used due to non-normality of the CPUE data (Figure 2). The CPUE values during each light phase were ranked in ascending order, and the rank sums were obtained. Then the corrected H -statistic, H_C , was calculated and tested for significance against table chi-square (X^2) values at the 90% confidence level ($= 0.10$). The 10% level was selected because it minimized the chances of making a Type II error: i.e., accepting no differences between ambient light conditions when in fact differences existed. In this study, making a Type I error—accepting that differences existed when in fact there were none—was perceived as less of a problem than making a Type II error.

Non-parametric Tukey-type comparisons, using the normal deviate Q —the difference between mean ranks divided by the standard error—were made to determine where differences existed between the light phases when significant differences were detected. The mean ranks of the CPUE data from the Kruskal-

Wallis test were used to derive Q which was then compared to tabled values at $Q_{0.10,2}$ (Zar 1984). Notched box plots were used to graphically compare the CPUE distributions at the three different ambient light phases for each species. The plots display the distribution of all points; the box represents the 25% and 75% range; the horizontal midline indicates the median; the strait vertical line represents the 10% and 90% range; values outside the 10-90% range are represented as points; and the width of the box is proportional to the square root of the number of observations. The notched section of the box represents 95% confidence intervals around the median. This information may be used to compare pairs of distributions. If the 95% confidence intervals do not overlap, the medians of the two distributions are significantly different at the selected confidence level. If the box is folded over, this indicates that the 95% confidence interval is larger than the 25-75% range. This may often happen when sample sizes are small; when this happens, little confidence should be placed in the interpretation of the box.

Tidal effects were not included in the analysis. Both flood and ebb tides were fished randomly and were represented within each light phase, so sets during all tidal stages within each light phase were combined. Weather and wave conditions were also not included in the analysis because various weather conditions were randomly distributed throughout each of the three ambient light conditions and because of the difficulties in quantifying these effects.

RESULTS

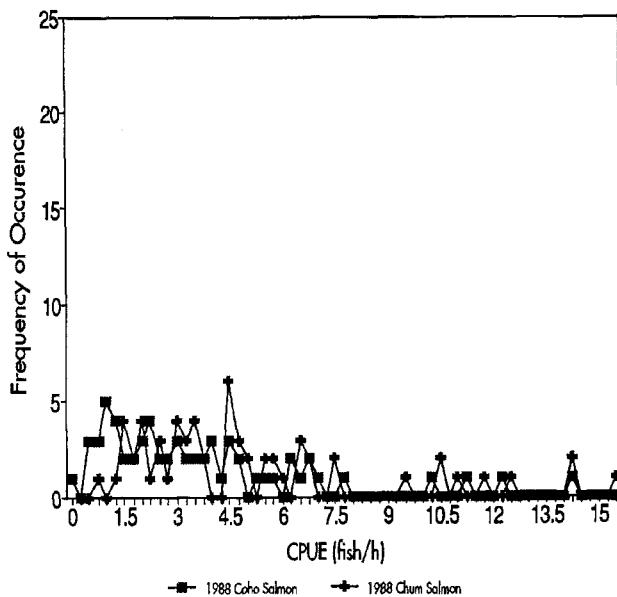


FIGURE 2.—Distributions of the CPUE for coho and chum salmon in the Clarence Strait experimental fishing in 1988.

In both 1988 and 1989 the highest number of sets and hours fished occurred during the daylight period (Tables 1-3). In 1988, 38 sets (60%) totaling 68.2 h (56.1%) were made onshore, and 25 sets (40%) totaling 53.3 h (43.9%) were made in the offshore location (Tables 1, 2). At the onshore location 22 daylight sets (35%) totaled 39.7 h, 11 twilight sets (17.5%) totaled 21.0 h, and 5 dark sets (8%) totaled 7.44 h. At the offshore location 13 daylight sets (20.6%) totaled 24.22 h, 9 twilight sets (14.3%) totaled 23.9 h, and 3 dark sets (4.7%) totaled 5.23 h.

In 1989 the daylight sets represented 40% of both the total sets and the total fishing time. Thirty-one sets (30%) totaling 31.12 h (29%) were fished during twilight period, and 30 sets (30%) totaling 32.98 h (31%) were fished during the dark period (Table 3). Catches and fishing times per set for 1988 are presented in Appendices A and B and for 1989 in Appendices C and D.

During 1989 rest breaks were taken only during daylight hours, and all available hours of twilight and darkness were fished because their duration was much more limited than daylight. The greater number of daylight sets was simply a product of the greater number of available daylight hours at the time of year that the fishing occurred.

In 1988 a total of 412 coho and 598 chum salmon were caught in 63 sets during the test fishery (Tables 1, 2). In addition, 112 pink salmon *O. gorbuscha*, 16 sockeye salmon *O. nerka*, and 10 chinook salmon *O. tshawytscha* were also caught during the course of fishing.

A total of 392 coho salmon and 337 chum salmon were caught in 102 sets during the fishing in 1989 (Table 3). Caught in addition were 363 pink salmon, 31 sockeye salmon, and 12 chinook salmon.

Coho Salmon

1988 Results

The 1988 sets produced a daylight median CPUE for coho salmon of 3.13/h, the highest of the three light phases for combined fishing locations. The dark phase median CPUE was 2.98/h, and the twilight median CPUE of 1.98/h was the lowest for the combined fishing locations (Table 1). No significant differences in CPUE between any of the light phases were detected (Figure 3).

The onshore daylight median coho CPUE of 4.36/h was the highest coho CPUE of all ambient light phases in the separate fishing locations, and the onshore twilight median coho CPUE of 1.90/h was the lowest (Table 1). The dark-phase onshore median CPUE was intermediate (3.53/h). The notched box plot (Figure 4), shows that the 95% confidence interval around the median (notched portion of box) overlaps for any paired comparison, suggesting no significant differ-

FIGURE 3.—Distributions of the CPUE for coho and chum salmon in the Clarence Strait experimental fishing in 1989.

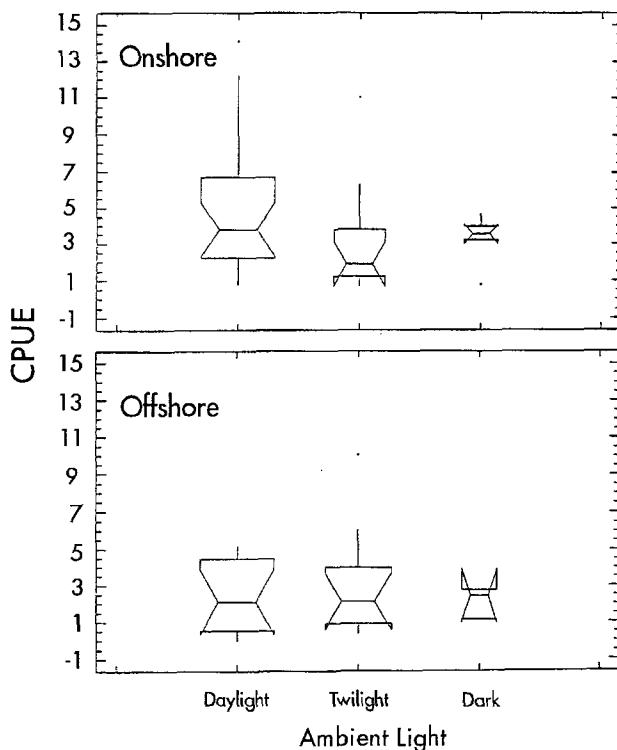


FIGURE 4.—Box plots of the coho CPUE showing the median and range (vertical bar and points) for ambient light phases in onshore (upper) and offshore (lower) fishing locations in the 1988 Clarence Strait experimental fishing.

ence in median values. However, because the boxes display folding-over for both twilight and dark sets, little significance should be placed on these results. The Kruskal-Wallis test also detected no significant differences ($H_C = 7.37$; $X_{0.10,2} = 9.24$) in coho CPUE between the three phases of ambient light in the separate fishing locations (Table 4).

The highest median coho CPUE for fishing locations combined occurred during daylight at 3.13 coho/h; the median CPUE's for the twilight and dark periods were 2.99 coho/h and 2.34 coho/h, respectively (Table 2). The notched box plot (Figure 4) shows no significant differences in median values between ambient light phases. The Kruskal-Wallis test also detected no significant differences ($H_C = 1.63$; $X_{0.10,2} = 4.61$) between the three light phases for combined fishing locations (Table 5).

1989 Results

In 1989 the twilight median coho CPUE of 3.02/h was the highest, the dark median coho CPUE 2.34/h was the lowest, and the daylight median coho CPUE was 2.35/h (Table 3). However, the Kruskal-Wallis test detected no significant differences in coho CPUE between the three phases of ambient light ($H_C = 1.49$;

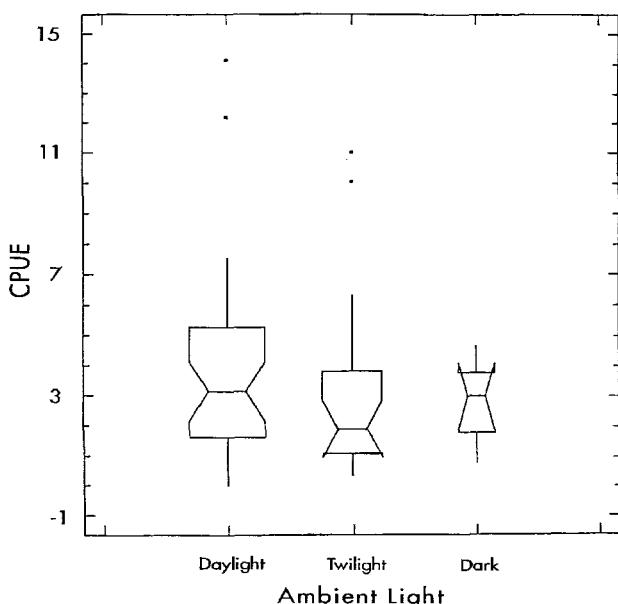


FIGURE 5.—Box plots of the coho CPUE showing the median and range (vertical bar and points) for ambient light phases and combined fishing locations in the 1988 Clarence Strait experimental fishing.

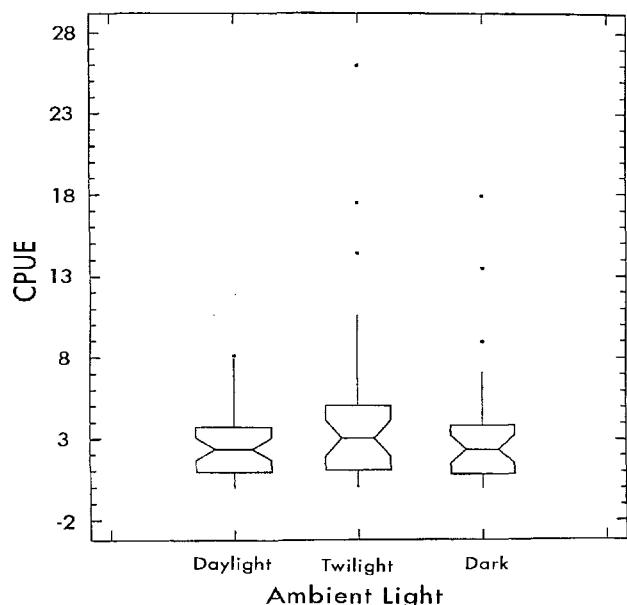


FIGURE 6.—Box plots of the coho CPUE showing the median and range (vertical bar and points) ambient light phases for the 1989 Clarence Strait experimental fishing.

$X_{0.10,2} = 4.61$), nor did the notched box plots indicate any significant differences (Table 6; Figure 5).

1988 and 1989 Combined

The median coho salmon CPUE for pooled 1988 and 1989 data were 2.82/h during twilight, 2.70/h during dark and 2.58/h during daylight (Table 3). No significant differences in CPUE for the three phases of ambient light were detected for the pooled coho data by the Kruskal-Wallis test ($H_C = 2.64$; $X_{10,2} = 4.61$) and the notched box plots (Table 7; Figure 6).

Chum Salmon

1988 Results

The 1988 sets produced a daylight median CPUE for chum salmon of 4.44/h, which was the highest of the three light phases for combined fishing locations. The dark median CPUE was 4.06/h, and the twilight median CPUE (3.43/h) was the lowest (Table 2). No significant differences in CPUE between any of the light phases were detected (Table 8).

The onshore daylight median chum CPUE of 6.42 chum/h was the highest chum CPUE of all ambient light phases in the separate fishing locations; the on-

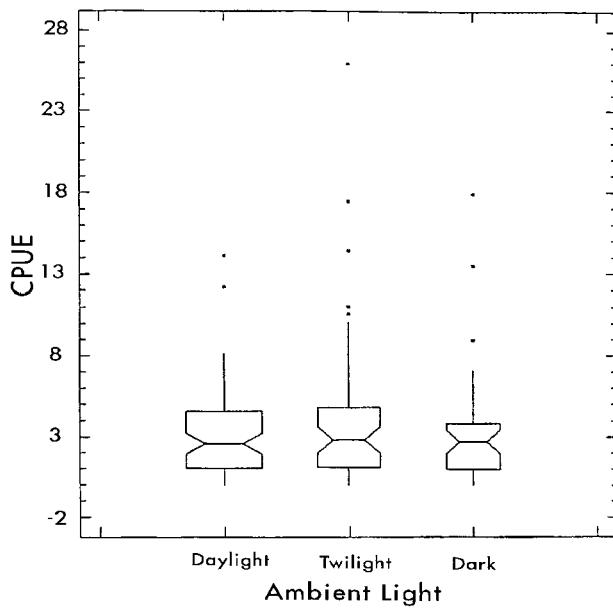


FIGURE 7.—Box plots of the coho CPUE showing the median and range (vertical bar and points) ambient light phases for the 1988 and 1989 Clarence Strait experimental fishing.

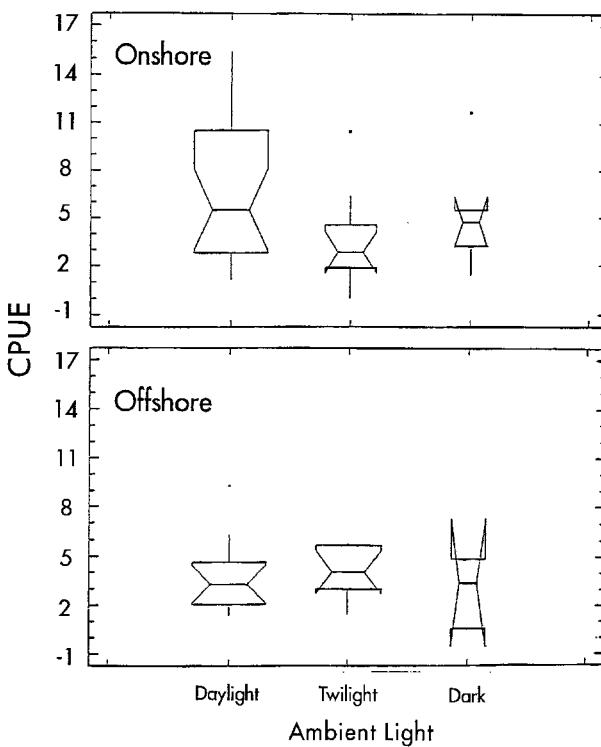


FIGURE 8.—Box plots of the coho CPUE showing the median and range (vertical bar and points) for ambient light phases in onshore (upper) and offshore (lower) fishing locations in the 1988 Clarence Strait experimental fishing.

shore twilight chum CPUE of 2.83 chum/h was the lowest (Table 2). The notched box plot (Figure 7) showed no significant differences in median values between locations or ambient light phases. The Kruskal-Wallis test also detected no significant differences ($H_C = 6.08$; $X_{0.10,2} = 9.24$) in chum CPUE between the three phases of ambient light in the separate fishing locations (Table 8).

The highest median chum CPUE for fishing locations combined occurred during daylight at 4.44 chum/h. The median CPUE for the dark and twilight periods were 4.06 chum/h and 3.43 chum/h, respectively (Table 2). The notched box plot (Figure 8) shows no significant differences in median values between ambient light phases. The Kruskal-Wallis test also detected no significant differences ($H_C = 2.07$; $X_{10,2} = 4.61$) between the three light phases for combined fishing locations (Table 9).

1989 Results

In the 1989 fishery the highest median chum CPUE occurred during daylight at 3.13 chum/h. The median CPUEs for the twilight and dark periods were 2.67 chum/h and 1.10 chum/h, respectively (Table 3). The Kruskal-Wallis test of the 1989 data detected a signifi-

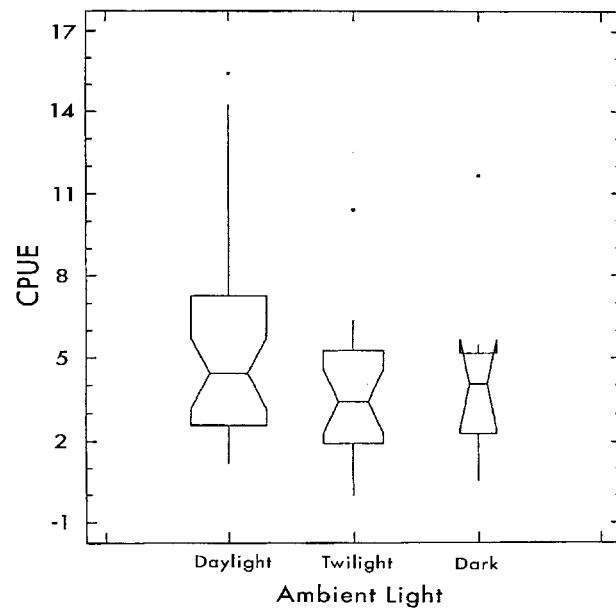


FIGURE 9.—Box plots of the coho CPUE showing the median and range (vertical bar and points) ambient light phases and combined fishing locations in the 1988 Clarence Strait experimental fishing.

cant difference ($H_C = 5.28$; $X_{0.10,2} = 4.61$) in chum CPUE between the three phases of ambient light (Table 10). The notched box plot (Figure 9) does indicate a difference in CPUE between daylight and dark hours but not between twilight and either daylight or dark.

Comparisons using the Tukey test of the chum salmon CPUE data from the Kruskal-Wallis test also showed that the differences between the daylight and dark CPUE were significant ($Q = 2.17$; $Q_{0.10,3} = 2.13$). However, no significant differences were detected between the daylight and twilight CPUE or between the twilight and dark CPUE (Table 11).

1988 and 1989 Combined.

The median chum salmon CPUE for pooled 1988 and 1989 data were 3.53/h during daylight, 3.30/h during twilight, and 1.60/h during dark (Table 3). Significant differences ($H_C = 9.07$; $X_{0.10,2} = 4.61$) in CPUE between the three phases of ambient light were detected for pooled chum data (Table 12). The notched box plot (Figure 10) does indicate a difference in CPUE between daylight and dark hours but not between twilight and either daylight or dark.

Comparisons of the pooled chum salmon CPUE data from the Kruskal-Wallis test also showed that the differences between the daylight and dark CPUE were significant ($Q = 3.05$; $Q_{0.10,3} = 2.13$). No significant differences were detected between the daylight and twilight CPUE or between the twilight and dark CPUE (Table 13).

DISCUSSION

The results obtained for coho salmon in 1989 reaffirmed the conclusions derived in 1988. (1) Coho salmon gill net CPUE in District 6 commercial gill net areas is not significantly influenced by ambient light conditions. (2) When the District 6 gill net fishery is targeted on chum salmon, the use of diel closures based on ambient light conditions would not be a useful management option to reduce coho harvests during years of seriously reduced coho abundance.

The finding that gill net CPUE for chum salmon is apparently influenced by ambient light conditions has limited uses for management of the District 6 gill net

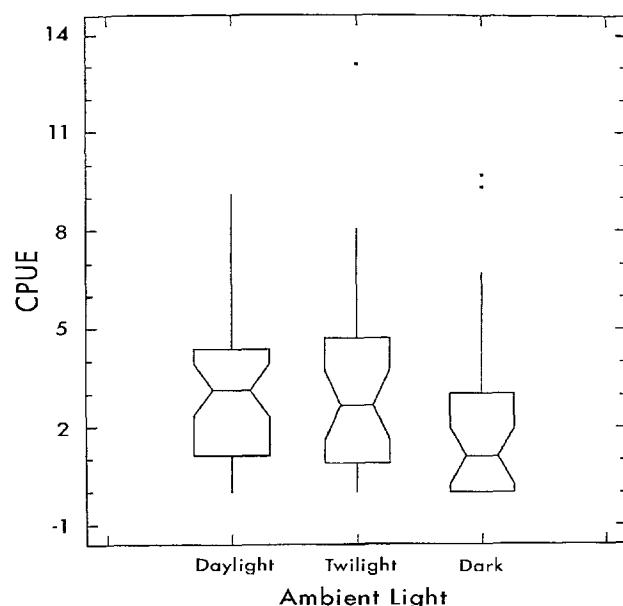


FIGURE 10.—Box plots of the chumCPUE showing the median and range (vertical bar and points) for ambient light phases and combined fishing locations in the 1989 Clarence Strait gill net test fishery.

fisheries. Currently sockeye, pink, and coho salmon are targeted in this district, and chum salmon are caught incidentally to these species. Had this study shown that both coho and chum salmon CPUE varied as a function of ambient light conditions, then the

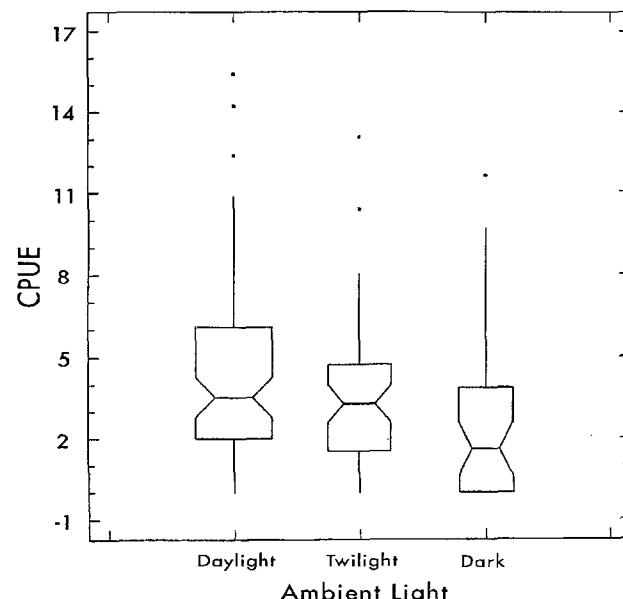


FIGURE 11.—Box plots of the chum CPUE showing the median and range (vertical bar and points) for the 1989 and 1988 Clarence Strait experimental fishing.

management staff could have employed the appropriate diel closures to conserve of coho salmon while maximizing the catch of chum salmon.

Although the results were similar for both years, the limited number of dark sets (8) made in 1988 may have been too few to allow for satisfactory analysis. Increasing the number of dark sets in 1989 to provide a more representative sample did not effect results in the coho portion of the study but may have resulted in different findings for chum salmon CPUE. The chum mean rank for the dark period in 1988 (30.50) was greater than the twilight period (27.76), whereas the 1989 mean dark period rank (41.12) was less than both the twilight (55.02) and daylight (56.44) periods. The

small number of dark sets in 1988 could have caused an inordinately high percentage of sets with large CPUE values to be clumped in the dark period.

Although no further studies are planned, similar tests conducted earlier in the fishing season may be warranted to establish whether ambient light has any significant impact on sockeye or pink salmon catches. Although full dark periods are very limited during the summer months, daylight and twilight periods are extensive. Because specific periods within each of the ambient light phases differ from the periods in this study, their affect on individual species behavior may also be different.

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TABLE 1.—Coho salmon catches, median CPUE (coho/h), number of sets, and hours fished for each of three ambient light phases and fishing locations experimentally fished in Clarence Strait during 1988.

| | Daylight | Twilight | Dark | Totals |
|-----------------------|----------|----------|-------|--------|
| <u>Onshore Sets:</u> | | | | |
| Catch | 193 | 51 | 24 | 268 |
| Median CPUE | 4.36 | 1.90 | 3.53 | |
| Sets | 22 | 11 | 5 | 38 |
| Hours Fished | 39.72 | 21.04 | 7.44 | 68.20 |
| <u>Offshore Sets:</u> | | | | |
| Catch | 57 | 76 | 11 | 144 |
| Median CPUE | 2.10 | 2.13 | 2.44 | |
| Sets | 12 | 10 | 3 | 25 |
| Hours Fished | 24.22 | 23.89 | 5.23 | 53.34 |
| <u>Combined:</u> | | | | |
| Catch | 250 | 127 | 35 | 412 |
| Median CPUE | 3.13 | 1.98 | 2.98 | |
| Sets | 34 | 21 | 8 | 63 |
| Hours Fished | 63.94 | 44.93 | 12.67 | 121.54 |

TABLE 2.—Chum salmon catches, median CPUE (coho/h), number of sets, and hours fished for each of three ambient light phases and fishing locations experimentally fished in Clarence Strait during 1988.

| | Daylight | Twilight | Dark | Totals |
|-----------------------|----------|----------|-------|--------|
| <u>Onshore Sets:</u> | | | | |
| Catch | 266 | 83 | 35 | 384 |
| Median CPUE | 6.42 | 2.83 | 4.74 | |
| Sets | 22 | 11 | 5 | 38 |
| Hours Fished | 39.72 | 21.04 | 7.44 | 68.20 |
| <u>Offshore Sets:</u> | | | | |
| Catch | 99 | 100 | 15 | 214 |
| Median CPUE | 3.32 | 4.06 | 3.38 | |
| Sets | 12 | 10 | 3 | 25 |
| Hours Fished | 24.22 | 23.89 | 5.23 | 53.34 |
| <u>Combined:</u> | | | | |
| Catch | 365 | 183 | 50 | 598 |
| Median CPUE | 4.44 | 3.43 | 4.06 | |
| Sets | 34 | 21 | 8 | 63 |
| Hours Fished | 63.94 | 44.93 | 12.67 | 121.54 |

TABLE 3.—Coho and chum salmon catches, median CPUE (fish/h), hours fished, and number of sets for each of three ambient light phases experimentally fished in Clarence Strait for 1989 sets and combined 1988-89 sets.

| | Daylight | Twilight | Dark | Totals |
|---------------------------------------|----------|----------|-------|--------|
| <u>1989 Sets:</u> | | | | |
| Coho Catch | | 117 | 153 | 1222 |
| Median Coho CPUE | 2.35 | 3.02 | 2.34 | |
| Chum Catch | | 145 | 113 | 287 |
| Median Chum CPUE | 3.13 | 2.67 | 1.10 | |
| Sets | | 41 | 31 | 302 |
| Hours Fished | 43.18 | 31.12 | 32.98 | 107.28 |
| <u>Combined 1988 & 1989 Sets:</u> | | | | |
| Coho Catch | | 367 | 280 | 1504 |
| Median Coho CPUE | 2.58 | 2.82 | 2.70 | |
| Chum Catch | | 510 | 296 | 1235 |
| Median Chum CPUE | 3.53 | 3.30 | 1.60 | |
| Sets | | 75 | 52 | 365 |
| Hours Fished | 107.12 | 76.05 | 45.65 | 228.82 |

TABLE 4.—Coho salmon CPUE values, ranks, and resultant statistics from the Kruskal-Wallis test for ambient light phases in separate fishing locations for the 1988 Clarence Strait experimental fishing.

| Onshore Daylight CPUE | Onshore Daylight Rank | Offshore Daylight CPUE | Offshore Daylight Rank | Onshore Twilight CPUE | Onshore Twilight Rank | Offshore Twilight CPUE | Offshore Twilight Rank | Onshore Dark CPUE | Onshore Dark Rank | Offshore Dark CPUE | Offshore Dark Rank |
|--------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------|----------------------|-----------------------|-----------------------|
| 0.79 | 8.5 | 0.00 | 1 | 0.69 | 6 | 0.34 | 2 | 0.79 | 8.5 | 1.13 | 14 |
| 1.17 | 15 | 0.40 | 3 | 0.98 | 12 | 0.75 | 7 | 3.20 | 36 | 2.44 | 28.5 |
| 1.46 | 18 | 0.49 | 4 | 1.22 | 16 | 0.93 | 11 | 3.53 | 39 | 2.76 | 32 |
| 1.63 | 19.5 | 0.55 | 5 | 1.62 | 19.5 | 1.09 | 13 | 3.98 | 42 | | |
| 2.08 | 24 | 0.86 | 10 | 1.85 | 21 | 1.36 | 17 | 4.66 | 49 | | |
| 2.22 | 26 | 1.94 | 23 | 1.90 | 22 | 2.89 | 34 | | | | |
| 2.45 | 28.5 | 2.25 | 27 | 2.17 | 25 | 3.04 | 35 | | | | |
| 2.58 | 30 | 3.62 | 40 | 3.46 | 37.5 | 4.00 | 43 | | | | |
| 2.62 | 31 | 4.44 | 45 | 3.79 | 41 | 6.02 | 53 | | | | |
| 2.80 | 33 | 4.47 | 46.5 | 6.32 | 55 | 10.07 | 61 | | | | |
| 3.46 | 37.5 | 6.48 | 46.5 | 11.02 | 60 | | | | | | |
| 4.14 | 44 | 5.16 | 50 | | | | | | | | |
| 4.58 | 48 | | | | | | | | | | |
| 5.27 | 51 | | | | | | | | | | |
| 5.57 | 52 | | | | | | | | | | |
| 6.23 | 54 | | | | | | | | | | |
| 6.67 | 56 | | | | | | | | | | |
| 6.71 | 57 | | | | | | | | | | |
| 6.96 | 58 | | | | | | | | | | |
| 7.53 | 59 | | | | | | | | | | |
| 12.20 | 62 | | | | | | | | | | |
| 14.12 | 63 | | | | | | | | | | |
| SUM: | | | | | | | | | | | |
| (Ri) | | 875 | | 301 | | 316 | | 276 | | 174.5 | |
| ni | 22 | 12 | | 11 | | 10 | | 5 | | 3 | |
| Median | 4.36 | | 2.10 | | 1.90 | | 2.13 | | 3.53 | | 2.44 |
| Mean | 4.69 | | 2.39 | | 3.18 | | 3.05 | | 3.23 | | 2.11 |
| SD | 3.45 | | 1.93 | | 3.06 | | 3.05 | | 3.22 | | 0.87 |

Combined Locations and Light Phases:

| | |
|--------|------|
| N | 63 |
| Median | 2.76 |
| Mean | 3.49 |
| SD | 2.91 |

The corrected H-statistic, H_C , was 7.366 and was less than the critical chi-square value ($\chi^2_{0.10,5}$) of 9.236.

TABLE 5.—Coho salmon CPUE values, ranks, and resultant statistics from the Kruskal-Wallis test for ambient light phases in combined fishing locations for the 1988 Clarence Strait experimental fishing.

| Daylight | | Twilight | | Dark | |
|------------------------|------|----------|------|------|------|
| CPUE | Rank | CPUE | Rank | CPUE | Rank |
| 0.00 | 1 | 0.34 | 2 | 0.79 | 8.5 |
| 0.40 | 3 | 0.69 | 6 | 1.13 | 14 |
| 0.49 | 4 | 0.75 | 7 | 2.44 | 28.5 |
| 0.55 | 5 | 0.93 | 11 | 2.76 | 32 |
| 0.79 | 8.5 | 0.98 | 12 | 3.20 | 36 |
| 0.86 | 10 | 1.09 | 13 | 3.53 | 39 |
| 1.17 | 15 | 1.22 | 16 | 3.98 | 42 |
| 1.46 | 18 | 1.36 | 17 | 4.66 | 49 |
| 1.63 | 19.5 | 1.62 | 19.5 | | |
| 1.94 | 23 | 1.85 | 21 | | |
| 2.08 | 24 | 1.90 | 22 | | |
| 2.22 | 26 | 2.17 | 25 | | |
| 2.25 | 27 | 2.89 | 34 | | |
| 2.45 | 28.5 | 3.04 | 35 | | |
| 2.58 | 30 | 3.46 | 37.5 | | |
| 2.62 | 31 | 3.79 | 41 | | |
| 2.80 | 33 | 4.00 | 43 | | |
| 3.46 | 37.5 | 6.02 | 53 | | |
| 3.62 | 40 | 6.32 | 55 | | |
| 4.14 | 44 | 10.07 | 60 | | |
| 4.44 | 45 | 11.02 | 61 | | |
| 4.47 | 46.5 | | | | |
| 4.48 | 46.5 | | | | |
| 4.58 | 48 | | | | |
| 5.16 | 50 | | | | |
| 5.27 | 51 | | | | |
| 5.57 | 52 | | | | |
| 6.23 | 54 | | | | |
| 6.67 | 56 | | | | |
| 6.71 | 57 | | | | |
| 6.96 | 58 | | | | |
| 7.53 | 59 | | | | |
| 12.20 | 62 | | | | |
| 14.12 | 63 | | | | |
| SUM | | | | | |
| (Ri) | 1176 | 591 | 249 | | |
| ni | 34 | 21 | 8 | | |
| Median | 3.13 | 1.98 | 2.98 | | |
| Mean | 3.88 | 3.12 | 2.81 | | |
| SD | 3.17 | 2.97 | 1.34 | | |
| Light Phases Combined: | | | | | |
| N | 63 | | | | |
| Median | 2.76 | | | | |
| Mean | 3.49 | | | | |
| SD | 2.91 | | | | |

The corrected H-statistic, H_C , was 1.63 and was less than the critical chi-square value ($\chi^2_{0.10,2}$) of 4.605.

TABLE 6.—Coho salmon CPUE values, ranks, and resultant statistics from the Kruskal-Wallis test for ambient light phases for the 1989 Clarence Strait experimental fishing.

| Daylight | | Twilight | | Dark | |
|---|--------|----------|------|--------|------|
| CPUE | Rank | CPUE | Rank | CPUE | Rank |
| 0.00 | 10 | 0.00 | 10 | 0.00 | 10 |
| 0.00 | 10 | 0.00 | 10 | 0.00 | 10 |
| 0.00 | 10 | 0.00 | 10 | 0.00 | 10 |
| 0.00 | 10 | 0.78 | 21 | 0.00 | 10 |
| 0.00 | 10 | 0.89 | 24 | 0.00 | 10 |
| 0.00 | 10 | 0.92 | 25 | 0.00 | 10 |
| 0.00 | 10 | 1.07 | 31 | 0.81 | 22 |
| 0.67 | 20 | 1.10 | 32 | 0.98 | 27 |
| 0.83 | 23 | 1.13 | 33.5 | 1.05 | 29.5 |
| 0.94 | 26 | 1.28 | 36 | 1.24 | 35 |
| 1.02 | 28 | 2.38 | 48 | 1.86 | 37 |
| 1.04 | 29.5 | 2.45 | 49 | 1.89 | 38.5 |
| 1.12 | 33.5 | 2.75 | 53 | 1.97 | 41 |
| 1.90 | 38.5 | 2.96 | 56 | 2.03 | 43.5 |
| 1.95 | 40 | 3.02 | 57.5 | 2.65 | 52 |
| 2.00 | 42 | 3.45 | 64.5 | 2.84 | 54 |
| 2.03 | 43.5 | 3.48 | 67 | 3.16 | 59 |
| 2.09 | 45 | 3.58 | 70 | 3.19 | 60.5 |
| 2.14 | 46 | 3.58 | 70 | 3.31 | 62 |
| 2.35 | 47 | 3.84 | 76 | 3.58 | 70 |
| 2.47 | 50 | 4.71 | 80 | 3.69 | 72 |
| 2.55 | 51 | 4.92 | 81 | 3.82 | 75 |
| 2.93 | 55 | 5.03 | 83 | 4.17 | 77 |
| 3.03 | 57.5 | 5.11 | 84 | 4.97 | 82 |
| 3.18 | 60.5 | 6.86 | 90 | 5.83 | 87 |
| 3.43 | 63 | 8.00 | 94 | 7.06 | 91 |
| 3.46 | 64.5 | 10.59 | 97 | 8.94 | 96 |
| 3.48 | 67 | 14.40 | 99 | 13.49 | 98 |
| 3.48 | 67 | 17.45 | 100 | 17.89 | 101 |
| 3.75 | 73 | 25.95 | 102 | | |
| 5.67 | 86 | | | | |
| 6.00 | 88 | | | | |
| 6.13 | 89 | | | | |
| 7.27 | 92 | | | | |
| 7.94 | 93 | | | | |
| 8.12 | 95 | | | | |
| SUM | | | | | |
| (Ri) | 2009.5 | | | 1763.5 | 1480 |
| ni | 41 | | | 31 | 30 |
| Median | 2.35 | | 3.02 | | 2.34 |
| Mean | 2.71 | | 4.57 | | 3.35 |
| SD | 2.28 | | 5.68 | | 4.06 |
| Light Phases Combined: | | | | | |
| N | 102 | | | | |
| Median | 2.51 | | | | |
| Mean | 3.46 | | | | |
| SD | 4.12 | | | | |
| The corrected H-statistic, H_C , was 1.4880 and was less than the critical chi-square value ($\chi^2_{0.10,2}$) of 4.605. | | | | | |

TABLE 7.—Pooled coho salmon CPUE values, ranks, and resultant statistics from the Kruskal-Wallis test for ambient light phases for the 1988 and 1989 Clarence Strait experimental fishing.

| Daylight | | Twilight | | Dark | |
|----------|-------|----------|-------|-------|------|
| CPUE | Rank | CPUE | Rank | CPUE | Rank |
| 0.00 | 10.5 | 0.00 | 10.5 | 0.00 | 10.5 |
| 0.00 | 10.5 | 0.00 | 10.5 | 0.00 | 10.5 |
| 0.00 | 10.5 | 0.00 | 10.5 | 0.00 | 10.5 |
| 0.00 | 10.5 | 0.00 | 10.5 | 0.00 | 10.5 |
| 0.00 | 10.5 | 0.34 | 21 | 0.00 | 10.5 |
| 0.00 | 10.5 | 0.69 | 25 | 0.00 | 10.5 |
| 0.00 | 10.5 | 0.75 | 26.5 | 0.00 | 10.5 |
| 0.00 | 10.5 | 0.78 | 29 | 0.79 | 29 |
| 0.00 | 10.5 | 0.89 | 35 | 0.81 | 31 |
| 0.40 | 22 | 0.92 | 37 | 0.98 | 39.5 |
| 0.49 | 23 | 0.93 | 37 | 1.05 | 42.5 |
| 0.55 | 24 | 0.98 | 39.5 | 1.13 | 48 |
| 0.76 | 26.5 | 1.07 | 44 | 1.24 | 52 |
| 0.79 | 29 | 1.09 | 45.5 | 1.86 | 58.5 |
| 0.83 | 32 | 1.10 | 45.5 | 1.89 | 61 |
| 0.86 | 33 | 1.13 | 48 | 1.97 | 64 |
| 0.94 | 37 | 1.22 | 51 | 2.03 | 66.5 |
| 1.02 | 41 | 1.28 | 53 | 2.44 | 77 |
| 1.04 | 42.5 | 1.36 | 54 | 2.65 | 83 |
| 1.12 | 48 | 1.62 | 56.5 | 2.76 | 84.5 |
| 1.17 | 50 | 1.85 | 58.5 | 2.84 | 87 |
| 1.46 | 55 | 1.90 | 61 | 3.16 | 94 |
| 1.63 | 56.5 | 2.17 | 71 | 3.19 | 96 |
| 1.90 | 61 | 2.38 | 75 | 3.20 | 96 |
| 1.94 | 63.5 | 2.45 | 77 | 3.31 | 98 |
| 1.95 | 63.5 | 2.75 | 84.5 | 3.53 | 107 |
| 2.00 | 65 | 2.89 | 88 | 3.58 | 109 |
| 2.03 | 66.5 | 2.96 | 90 | 3.69 | 112 |
| 2.08 | 68.5 | 3.02 | 92 | 3.82 | 116 |
| 2.09 | 68.5 | 3.04 | 92 | 3.98 | 118 |
| 2.14 | 70 | 3.45 | 101.5 | 4.17 | 121 |
| 2.22 | 72 | 3.46 | 101.5 | 4.66 | 127 |
| 2.25 | 73 | 3.48 | 105 | 4.97 | 131 |
| 2.35 | 74 | 3.58 | 109 | 5.83 | 139 |
| 2.45 | 77 | 3.58 | 109 | 7.06 | 149 |
| 2.47 | 79 | 3.79 | 114.5 | 8.94 | 155 |
| 2.55 | 80 | 3.84 | 117 | 13.49 | 160 |
| 2.58 | 81 | 4.00 | 119 | 17.89 | 164 |
| 2.62 | 82 | 4.71 | 129 | | |
| 2.80 | 86 | 4.92 | 130 | | |
| 2.93 | 89 | 5.03 | 132 | | |
| 3.03 | 92 | 5.11 | 133 | | |
| 3.18 | 96 | 6.02 | 141 | | |
| 3.43 | 99 | 6.32 | 144 | | |
| 3.46 | 101.5 | 6.86 | 147 | | |
| 3.46 | 101.5 | 8.00 | 153 | | |
| 3.48 | 105 | 10.07 | 156 | | |
| 3.48 | 105 | 10.59 | 157 | | |
| 3.62 | 111 | 11.02 | 158 | | |
| 3.75 | 113 | 14.40 | 162 | | |
| 3.78 | 114.5 | 17.45 | 163 | | |
| 4.14 | 120 | 25.95 | 165 | | |
| 4.38 | 122 | | | | |
| 4.44 | 123 | | | | |
| 4.47 | 124.5 | | | | |
| 4.48 | 124.5 | | | | |
| 4.58 | 126 | | | | |
| 4.69 | 128 | | | | |
| 5.16 | 134 | | | | |
| 5.22 | 135 | | | | |
| 5.27 | 136 | | | | |
| 5.57 | 137 | | | | |

TABLE 7.—Continued.

| Daylight | | Twilight | | Dark | |
|--------------------------|------|----------|------|------|------|
| CPUE | Rank | CPUE | Rank | CPUE | Rank |
| 5.67 | 138 | | | | |
| 6.00 | 140 | | | | |
| 6.13 | 142 | | | | |
| 6.23 | 143 | | | | |
| 6.67 | 145 | | | | |
| 6.71 | 146 | | | | |
| 6.96 | 148 | | | | |
| 7.27 | 150 | | | | |
| 7.53 | 151 | | | | |
| 7.94 | 152 | | | | |
| 8.12 | 154 | | | | |
| 12.20 | 159 | | | | |
| 14.12 | 161 | | | | |
| SUM (R _i) | 6443 | | 4293 | | 2989 |
| n _i | 76 | | 51 | | 38 |
| Median | 2.58 | | 2.82 | | 2.70 |
| Mean | 3.24 | | 3.98 | | 3.23 |
| SD | 2.76 | | 4.79 | | 3.65 |
| Light Phases Combined: | | | | | |
| N | 165 | | | | |
| Median | 2.62 | | | | |
| Mean | 3.47 | | | | |
| SD | 3.70 | | | | |

TABLE 8.—Chum salmon CPUE values, ranks, and resultant statistics from the Kruskal-Wallis test for ambient light phases in separate fishing locations for the 1988 Clarence Strait experimental fishing.

| Onshore Daylight | | Offshore Daylight | | Onshore Twilight | | Offshore Twilight | | Onshore Dark | | Offshore Dark | |
|------------------|------|-------------------|-------|------------------|-------|-------------------|-------|--------------|------|---------------|------|
| CPUE | Rank | CPUE | Rank | CPUE | Rank | CPUE | Rank | CPUE | Rank | CPUE | Rank |
| 1.17 | 3 | 1.39 | 4.5 | 0.00 | 1 | 1.45 | 7 | 1.41 | 6 | 0.55 | 2 |
| 1.39 | 4.5 | 1.94 | 12.5 | 1.63 | 9 | 1.60 | 8 | 3.20 | 25 | 3.38 | 26 |
| 2.37 | 15 | 1.95 | 12.5 | 1.85 | 10 | 3.02 | 23 | 4.74 | 40 | 4.87 | 41.5 |
| 2.45 | 16.5 | 2.21 | 14 | 1.92 | 11 | 3.41 | 27 | 5.48 | 44 | | |
| 2.58 | 18 | 3.00 | 22 | 2.45 | 16.5 | 3.72 | 31 | 11.65 | 59 | | |
| 2.80 | 19 | 3.15 | 24 | 2.83 | 20 | 4.39 | 32.5 | | | | |
| 2.88 | 21 | 3.49 | 29 | 3.43 | 28 | 5.26 | 43 | | | | |
| 3.56 | 30 | 4.44 | 35.5 | 4.42 | 34 | 5.70 | 45 | | | | |
| 4.39 | 32.5 | 4.47 | 37 | 4.57 | 38 | 5.75 | 46 | | | | |
| 4.44 | 35.5 | 4.86 | 41.5 | 6.37 | 50 | 5.82 | 47 | | | | |
| 4.68 | 39 | 6.34 | 49 | 10.40 | 56 | | | | | | |
| 6.32 | 48 | 9.29 | 55 | | | | | | | | |
| 6.53 | 51 | | | | | | | | | | |
| 6.71 | 52 | | | | | | | | | | |
| 7.27 | 53 | | | | | | | | | | |
| 7.39 | 54 | | | | | | | | | | |
| 10.47 | 57 | | | | | | | | | | |
| 10.86 | 58 | | | | | | | | | | |
| 12.40 | 60 | | | | | | | | | | |
| 14.23 | 61.5 | | | | | | | | | | |
| 14.24 | 61.5 | | | | | | | | | | |
| 15.40 | 63 | | | | | | | | | | |
| SUM | | | | | | | | | | | |
| (Ri) | 853 | | 336.5 | | 273.5 | | 309.5 | | 174 | | 69.5 |
| ni | 22 | | 12 | | 11 | | 10 | | 5 | | 3 |
| Median | 6.42 | | 3.32 | | 2.83 | | 4.06 | | 4.74 | | 3.38 |
| Mean | 6.57 | | 3.88 | | 3.62 | | 4.01 | | 5.30 | | 2.94 |
| SD | 4.48 | | 2.23 | | 2.83 | | 1.67 | | 1.76 | | 2.19 |

Combined Locations and Light Phases:

| | |
|--------|-------|
| N | 63 |
| Median | 4.39 |
| Mean | 4.862 |
| SD | 3.478 |

The corrected H-statistic, H_C , was 6.077 and was less than the critical chi-square value ($\chi^2_{0.10,2}$) of 4.605.

TABLE 9.—Chum salmon CPUE values, ranks, and resultant statistics from the Kruskal-Wallis test for ambient light phases in combined fishing locations for the 1988 Clarence Strait experimental fishing.

| Daylight | Twilight | | Dark | | |
|-------------------|----------|-------|------|-------|------|
| | CPUE | Rank | CPUE | Rank | |
| 1.17 | 3 | 0.00 | 1 | 0.55 | 2 |
| 1.39 | 4.5 | 1.45 | 7 | 1.41 | 6 |
| 1.39 | 4.5 | 1.60 | 8 | 3.20 | 25 |
| 1.94 | 12.5 | 1.63 | 9 | 3.38 | 26 |
| 1.95 | 12.5 | 1.85 | 10 | 4.74 | 40 |
| 2.21 | 14 | 1.92 | 11 | 4.87 | 42 |
| 2.37 | 15 | 2.45 | 16.5 | 5.48 | 44 |
| 2.45 | 16.5 | 2.83 | 20 | 11.65 | 59 |
| 2.58 | 18 | 3.02 | 23 | | |
| 2.80 | 19 | 3.41 | 27 | | |
| 2.88 | 21 | 3.43 | 28 | | |
| 3.00 | 22 | 3.72 | 31 | | |
| 3.15 | 24 | 4.39 | 32.5 | | |
| 3.49 | 29 | 4.42 | 34 | | |
| 3.56 | 30 | 4.57 | 38 | | |
| 4.39 | 32.5 | 5.26 | 43 | | |
| 4.44 | 35.5 | 5.70 | 45 | | |
| 4.44 | 35.5 | 5.75 | 46 | | |
| 4.47 | 37 | 5.82 | 47 | | |
| 4.68 | 39 | 6.37 | 50 | | |
| 4.86 | 41 | 10.40 | 56 | | |
| 6.32 | 48 | | | | |
| 6.34 | 49 | | | | |
| 6.53 | 51 | | | | |
| 6.71 | 52 | | | | |
| 7.27 | 53 | | | | |
| 7.39 | 54 | | | | |
| 9.29 | 55 | | | | |
| 10.47 | 57 | | | | |
| 10.86 | 58 | | | | |
| 12.40 | 60 | | | | |
| 14.23 | 61.5 | | | | |
| 14.24 | 61.5 | | | | |
| 15.40 | 63 | | | | |
| SUM | | | | | |
| (R _i) | 1189 | | 583 | | 244 |
| n _i | 34 | | 21 | | 8 |
| Median | 4.44 | | 3.43 | | 4.06 |
| Mean | 5.62 | | 3.81 | | 4.41 |
| SD | 4.01 | | 2.30 | | 3.39 |

Light Phases Combined:

| | |
|--------|------|
| N | 63 |
| Median | 4.39 |
| Mean | 4.83 |
| SD | 3.48 |

The corrected H-statistic, H_C , was 2.07 and was less than the critical chi-square value ($\chi^2_{0.10,2}$) of 4.605.

TABLE 10.—Chum salmon CPUE values, ranks, and resultant statistics from the Kruskal-Wallis test for ambient light phases for the 1989 Clarence Strait experimental fishing.

| | Daylight | | Twilight | | Dark | |
|--|----------|------|----------|------|------|------|
| | CPUE | Rank | CPUE | Rank | CPUE | Rank |
| | 0.00 | 11.5 | 0.00 | 11.5 | 0.00 | 11.5 |
| | 0.00 | 11.5 | 0.00 | 11.5 | 0.00 | 11.5 |
| | 0.00 | 11.5 | 0.00 | 11.5 | 0.00 | 11.5 |
| | 0.00 | 11.5 | 0.00 | 11.5 | 0.00 | 11.5 |
| | 0.00 | 11.5 | 0.00 | 11.5 | 0.00 | 11.5 |
| | 0.85 | 24.5 | 0.89 | 26.5 | 0.00 | 11.5 |
| | 0.94 | 29 | 0.90 | 26.5 | 0.00 | 11.5 |
| | 0.98 | 30 | 0.92 | 28 | 0.00 | 11.5 |
| | 1.03 | 31.5 | 1.22 | 37 | 0.00 | 11.5 |
| | 1.12 | 35 | 1.28 | 39 | 0.83 | 23 |
| | 1.74 | 40 | 2.14 | 48.5 | 0.85 | 24.5 |
| | 1.89 | 43 | 2.38 | 51 | 1.04 | 31.5 |
| | 2.00 | 44 | 2.55 | 54 | 1.05 | 33.5 |
| | 2.02 | 45 | 2.61 | 55 | 1.06 | 33.5 |
| | 2.09 | 46 | 2.67 | 56 | 1.15 | 36 |
| | 2.14 | 48.5 | 3.20 | 61 | 1.24 | 38 |
| | 2.40 | 52 | 3.40 | 63 | 1.79 | 41 |
| | 2.73 | 57 | 3.43 | 64 | 1.86 | 42 |
| | 2.93 | 58 | 3.45 | 65 | 2.11 | 47 |
| | 3.13 | 60 | 3.69 | 70 | 2.29 | 50 |
| | 3.37 | 62 | 4.20 | 77 | 2.48 | 53 |
| | 3.50 | 66 | 4.58 | 79 | 3.03 | 59 |
| | 3.53 | 67 | 4.71 | 81 | 3.55 | 68 |
| | 3.66 | 69 | 4.80 | 82 | 3.90 | 74.5 |
| | 3.78 | 71.5 | 6.79 | 90 | 5.68 | 86 |
| | 3.78 | 71.5 | 7.06 | 93 | 6.22 | 88 |
| | 3.81 | 73 | 7.78 | 95 | 6.71 | 89 |
| | 3.90 | 74.5 | 7.94 | 96 | 9.32 | 100 |
| | 4.07 | 76 | 8.06 | 97 | 9.69 | 101 |
| | 4.38 | 78 | 13.09 | 102 | | |
| | 4.69 | 80 | | | | |
| | 4.93 | 83 | | | | |
| | 5.22 | 84 | | | | |
| | 5.41 | 85 | | | | |
| | 6.11 | 87 | | | | |
| | 6.86 | 91 | | | | |
| | 6.96 | 92 | | | | |
| | 7.15 | 94 | | | | |
| | 8.63 | 98 | | | | |
| | 9.10 | 99 | | | | |

| | | | |
|-------------------|------|--------|--------|
| SUM | 2314 | 1705.5 | 1233.5 |
| (R _i) | 41 | 31 | 30 |
| n _i | | | |
| Median | 3.13 | 2.67 | 1.10 |
| Mean | 3.19 | 3.35 | 2.20 |
| SD | 2.40 | 3.10 | 2.75 |

Light Phases Combined:

| | |
|--------|------|
| N | 102 |
| Median | 2.33 |
| Mean | 2.95 |
| SD | 2.75 |

The corrected H-statistic, H_C , was 5.328 and was less than the critical chi-square value ($\chi^2_{0.10,2}$) of 4.605.

TABLE 11.—Non-parametric Tukey-type comparisons of the 1989 chum salmon CPUE data from the Kruskal-Wallis test to determine between which light phases the significant differences occurred.

| | Daylight | Twilight | Dark |
|-----------------------|-----------------|----------|--------------------|
| Samples Ranked | 3 | 2 | 1 |
| Rank Sums (R_i) | 2314 | 1705.5 | 1233 |
| Sample Size (n_i) | 41 | 31 | 30 |
| Mean Rank (R_i) | 56.44 | 55.02 | 41.12 |
| Comparison | Difference | | |
| (B vs. A) | ($R_B - R_A$) | SE | Q |
| Day vs. Twi. | 56.44-55.02= | 7.010 | 0.203 |
| | 1.42 | | |
| Day vs. Dark | 56.44-41.12= | 7.074 | 2.166 ^a |
| | 15.32 | | |
| Twi. vs. Dark | 55.02-41.12= | 7.540 | 1.844 |
| | 13.90 | | |

^aIndicates significant difference at = 0.10

TABLE 12.—Pooled chum salmon CPUE values, ranks, and resultant statistics from the Kruskal-Wallis test for ambient light phases for the 1988 and 1989 Clarence Strait experimental fishing.

| | Daylight | | | Twilight | | |
|--|----------|-------|-------|----------|-------|-------|
| | CPUE | Rank | CPUE | Rank | CPUE | Rank |
| | 0.00 | 12 | 0.00 | 12 | 0.00 | 12 |
| | 0.00 | 12 | 0.00 | 12 | 0.00 | 12 |
| | 0.00 | 12 | 0.00 | 12 | 0.00 | 12 |
| | 0.00 | 12 | 0.00 | 12 | 0.00 | 12 |
| | 0.00 | 12 | 0.00 | 12 | 0.00 | 12 |
| | 0.85 | 26.5 | 0.00 | 12 | 0.00 | 12 |
| | 0.94 | 31 | 0.89 | 28.5 | 0.00 | 12 |
| | 0.98 | 32 | 0.90 | 28.5 | 0.00 | 12 |
| | 1.03 | 34.5 | 0.92 | 30 | 0.00 | 12 |
| | 1.12 | 37 | 1.22 | 40 | 0.55 | 24 |
| | 1.17 | 39 | 1.28 | 42 | 0.83 | 25 |
| | 1.39 | 43.5 | 1.45 | 46 | 0.85 | 26.5 |
| | 1.39 | 43.5 | 1.60 | 47 | 1.04 | 34.5 |
| | 1.74 | 49 | 1.63 | 48 | 1.05 | 34.5 |
| | 1.89 | 53 | 1.85 | 51.5 | 1.06 | 34.5 |
| | 1.94 | 55.5 | 1.92 | 54 | 1.15 | 38 |
| | 1.95 | 55.5 | 2.14 | 61.5 | 1.24 | 41 |
| | 2.00 | 57 | 2.38 | 65.5 | 1.41 | 45 |
| | 2.02 | 58 | 2.45 | 68.5 | 1.79 | 50 |
| | 2.09 | 59 | 2.55 | 71 | 1.86 | 51.5 |
| | 2.14 | 61.5 | 2.61 | 73 | 2.11 | 60 |
| | 2.21 | 63 | 2.67 | 74 | 2.29 | 64 |
| | 2.37 | 65.5 | 2.83 | 77 | 2.48 | 70 |
| | 2.40 | 67 | 3.02 | 81.5 | 3.03 | 81.5 |
| | 2.45 | 68.5 | 3.20 | 85.5 | 3.20 | 85.5 |
| | 2.58 | 72 | 3.40 | 89.5 | 3.38 | 87.5 |
| | 2.73 | 75 | 3.41 | 89.5 | 3.55 | 97.5 |
| | 2.80 | 76 | 3.43 | 91.5 | 3.90 | 105.5 |
| | 2.88 | 78 | 3.43 | 91.5 | 4.74 | 121 |
| | 2.93 | 79 | 3.45 | 93 | 4.87 | 123.5 |
| | 3.00 | 80 | 3.69 | 100 | 5.48 | 129 |
| | 3.13 | 83 | 3.72 | 101 | 5.68 | 130 |
| | 3.15 | 84 | 4.20 | 108 | 6.22 | 135 |
| | 3.37 | 87.5 | 4.39 | 110 | 6.71 | 140.5 |
| | 3.49 | 94.5 | 4.42 | 112 | 9.32 | 155 |
| | 3.50 | 94.5 | 4.57 | 116.5 | 9.69 | 156 |
| | 3.53 | 96 | 4.58 | 116.5 | 11.65 | 160 |
| | 3.56 | 97.5 | 4.71 | 120 | | |
| | 3.66 | 99 | 4.80 | 122 | | |
| | 3.78 | 102.5 | 5.26 | 127 | | |
| | 3.78 | 102.5 | 5.70 | 131 | | |
| | 3.81 | 104 | 5.75 | 132 | | |
| | 3.90 | 105.5 | 5.82 | 133 | | |
| | 4.07 | 107 | 6.37 | 138 | | |
| | 4.38 | 110 | 6.79 | 142 | | |
| | 4.39 | 110 | 7.06 | 145 | | |
| | 4.44 | 113.5 | 7.78 | 149 | | |
| | 4.44 | 113.5 | 7.94 | 150 | | |
| | 4.47 | 115 | 8.06 | 151 | | |
| | 4.68 | 118.5 | 10.40 | 157 | | |
| | 4.69 | 118.5 | 13.09 | 162 | | |
| | 4.86 | 123.5 | | | | |
| | 4.93 | 125 | | | | |
| | 5.22 | 126 | | | | |
| | 5.41 | 128 | | | | |
| | 6.11 | 134 | | | | |
| | 6.32 | 136 | | | | |
| | 6.34 | 137 | | | | |
| | 6.53 | 139 | | | | |
| | 6.71 | 140.5 | | | | |
| | 6.86 | 143 | | | | |

- Continued -

TABLE 12.—Continued.

| Daylight | Twilight | | Dark | | | |
|---|----------|------|------|------|------|------|
| | CPUE | Rank | CPUE | Rank | CPUE | Rank |
| 6.96 | 144 | | | | | |
| 7.15 | 146 | | | | | |
| 7.27 | 147 | | | | | |
| 7.39 | 148 | | | | | |
| 8.63 | 152 | | | | | |
| 9.10 | 153 | | | | | |
| 9.29 | 154 | | | | | |
| 10.47 | 158 | | | | | |
| 10.86 | 159 | | | | | |
| 12.40 | 161 | | | | | |
| 14.23 | 163.5 | | | | | |
| 14.24 | 163.5 | | | | | |
| 15.40 | 165 | | | | | |
| SUM | | | | | | |
| (R _i) | 6934 | | 4335 | | 2426 | |
| n _i | | 7 | | 52 | | 38 |
| Median | 3.53 | | 3.30 | | 1.60 | |
| Mean | 4.29 | | 3.52 | | 2.66 | |
| SD | 3.43 | | 2.79 | | 2.99 | |
| Light Phases Combined: | | | | | | |
| N | 165 | | | | | |
| Median | 3.03 | | | | | |
| Mean | 3.68 | | | | | |
| SD | 3.40 | | | | | |
| The corrected H-statistic, H _C , was 9.074 and was less than the critical chi-square value ($\chi^2_{0.10,2}$) of 4.605. | | | | | | |

TABLE 13.—Non-parametric Tukey-type comparisons of the pooled 1988 and 1989 chum salmon CPUE data from the Kruskal-Wallis test to determine between which light phases the significant differences occurred.

| | Daylight | Twilight | Dark |
|-------------------------------|-----------------------------------|----------|-------------------------------|
| Samples Ranked | 3 | 2 | 1 |
| Rank Sums (R _i) | 6934 | 4335 | 2426 |
| Sample Size (n _i) | 75 | 52 | 38 |
| Mean Rank (R̄ _i) | 92.45 | 83.37 | 63.48 |
| Comparison | Difference | | |
| (B vs. A) | (R _B -R _A) | SE | Q |
| Day vs. Twi. | 92.45-83.37= 9.08 | 8.614 | 1.054 Q _{10,3} 2.128 |
| Day vs. Dark | 92.45-63.48= 28.97 | 9.500 | 3.050 ^a 2.128 |
| Twi. vs. Dark | 83.37-63.48= 19.89 | 10.182 | 1.953 2.128 |

^a Indicates significant difference at = 0.10

APPENDIX

Appendix A.—Coho salmon catches, time of sets, hours fished, CPUE (coho/h), ambient light phase and date of sets by fishing location and time for the 1988 Clarence Strait experimental fishing.

| Date | Coho Catch | Start Net Out | Net Full Out | Start Net In | Net Full In | Fishing Time (Hours) | CPUE | Ambient Light Phase |
|-------------------------|------------|---------------|--------------|--------------|-------------|----------------------|-------|---------------------|
| <u>ONSHORE:</u> | | | | | | | | |
| 09/02 | 4 | 0326 | 0338 | 0548 | 0613 | 2.48 | 1.62 | Twilight |
| 08/26 | 9 | 0455 | 0503 | 0536 | 0600 | 0.82 | 11.02 | Twilight |
| 09/07 | 3 | 0407 | 0432 | 0632 | 0701 | 2.45 | 1.22 | Twilight |
| 09/02 | 3 | 0623 | 0632 | 0745 | 0752 | 1.35 | 2.22 | Daylight |
| 08/26 | 4 | 0611 | 0619 | 0740 | 0756 | 1.55 | 2.58 | Daylight |
| 09/07 | 2 | 0705 | 0732 | 0800 | 0815 | 0.82 | 2.45 | Daylight |
| 09/16 | 16 | 0713 | 0721 | 0916 | 0954 | 2.30 | 6.96 | Daylight |
| 08/26 | 1 | 0813 | 0819 | 0924 | 0940 | 1.27 | 0.79 | Daylight |
| 09/02 | 12 | 0755 | 0803 | 0941 | 1008 | 1.93 | 6.23 | Daylight |
| 08/24 | 18 | 0812 | 0822 | 0931 | 1000 | 1.48 | 12.20 | Daylight |
| 09/14 | 3 | 0805 | 0820 | 1033 | 1100 | 2.57 | 1.17 | Daylight |
| 09/07 | 6 | 0825 | 0840 | 1035 | 1105 | 2.29 | 2.62 | Daylight |
| 09/15 | 6 | 1008 | 1016 | 1142 | 1210 | 1.73 | 3.46 | Daylight |
| 09/02 | 3 | 1014 | 1022 | 1137 | 1152 | 1.44 | 2.08 | Daylight |
| 08/24 | 8 | 1003 | 1010 | 1150 | 1215 | 1.93 | 4.14 | Daylight |
| 09/07 | 22 | 1110 | 1118 | 1230 | 1305 | 1.56 | 14.12 | Daylight |
| 09/02 | 2 | 1201 | 1211 | 1319 | 1337 | 1.37 | 1.46 | Daylight |
| 09/16 | 16 | 1224 | 1233 | 1435 | 1508 | 2.38 | 6.71 | Daylight |
| 08/24 | 19 | 1217 | 1225 | 1457 | 1527 | 2.85 | 6.67 | Daylight |
| 09/02 | 2 | 1346 | 1354 | 1455 | 1512 | 1.23 | 1.63 | Daylight |
| 08/24 | 9 | 1530 | 1537 | 1705 | 1727 | 1.71 | 5.27 | Daylight |
| 09/16 | 6 | 1515 | 1520 | 1715 | 1737 | 2.14 | 2.80 | Daylight |
| 09/02 | 9 | 1525 | 1532 | 1652 | 1719 | 1.62 | 5.57 | Daylight |
| 09/14 | 17 | 1532 | 1540 | 1730 | 1813 | 2.26 | 7.53 | Daylight |
| 09/07 | 9 | 1617 | 1624 | 1805 | 1832 | 1.97 | 4.58 | Daylight |
| 09/06 | 4 | 1805 | 1825 | 2010 | 2040 | 2.17 | 1.85 | Twilight |
| 09/01 | 1 | 1836 | 1843 | 1958 | 2016 | 1.46 | 0.69 | Twilight |
| 08/24 | 9 | 1730 | 1734 | 1957 | 2019 | 2.60 | 3.46 | Twilight |
| 08/25 | 3 | 2029 | 2037 | 2052 | 2111 | 0.48 | 6.32 | Twilight |
| 09/15 | 5 | 1837 | 1850 | 2043 | 2121 | 2.31 | 2.17 | Twilight |
| 08/30 | 5 | 1825 | 1845 | 2055 | 2130 | 2.63 | 1.90 | Twilight |
| 09/01 | 2 | 2023 | 2032 | 2215 | 2245 | 2.04 | 0.98 | Twilight |
| 08/24 | 6 | 2025 | 2033 | 2152 | 2216 | 1.58 | 3.79 | Twilight |
| 09/06 | 6 | 2045 | 2110 | 2235 | 2305 | 1.88 | 3.20 | Dark |
| 08/30 | 8 | 2137 | 2152 | 2328 | 2402 | 2.01 | 3.98 | Dark |
| 08/24 | 1 | 2220 | 2228 | 2329 | 2351 | 1.27 | 0.79 | Dark |
| 09/01 | 4 | 2254 | 2303 | 2340 | 2400 | 0.86 | 4.66 | Dark |
| 09/06 | 5 | 2315 | 2330 | 2435 | 2500 | 1.42 | 3.53 | Dark |
| | | | | | | 65.36 | | |
| <u>OFFSHORE:</u> | | | | | | | | |
| 08/25 | 23 | 0317 | 0332 | 0523 | 0600 | 2.28 | 10.07 | Twilight |
| 09/15 | 3 | 0350 | 0407 | 0630 | 0657 | 2.75 | 1.09 | Twilight |
| 09/16 | 1 | 0345 | 0404 | 0640 | 0704 | 2.96 | 0.34 | Twilight |
| 09/08 | 19 | 0342 | 0405 | 0644 | 0722 | 3.16 | 6.02 | Twilight |
| 09/09 | 9 | 0403 | 0417 | 0650 | 0725 | 2.96 | 3.04 | Twilight |
| 08/25 | 2 | 0606 | 0613 | 0807 | 0852 | 2.33 | 0.86 | Daylight |
| 09/09 | 5 | 0728 | 0735 | 0930 | 1000 | 2.23 | 2.25 | Daylight |
| 09/15 | 11 | 0707 | 0718 | 0921 | 1001 | 2.48 | 4.44 | Daylight |
| 09/08 | 1 | 0732 | 0749 | 0955 | 1023 | 2.48 | 0.40 | Daylight |
| 08/25 | 1 | 0852 | 0900 | 1050 | 1108 | 2.05 | 0.49 | Daylight |
| 09/16 | 9 | 1000 | 1009 | 1153 | 1217 | 2.01 | 4.48 | Daylight |
| 09/09 | 4 | 1008 | 1015 | 1201 | 1229 | 2.06 | 1.94 | Daylight |
| 08/25 | 1 | 1108 | 1117 | 1253 | 1309 | 1.81 | 0.55 | Daylight |
| 09/14 | 0 | 1110 | 1128 | 1237 | 1254 | 1.44 | 0.00 | Daylight |
| 09/15 | 8 | 1216 | 1223 | 1343 | 1402 | 1.55 | 5.16 | Daylight |
| 09/09 | 7 | 1230 | 1238 | 1353 | 1423 | 1.57 | 4.47 | Daylight |
| 09/14 | 8 | 1256 | 1304 | 1458 | 1527 | 2.21 | 3.62 | Daylight |
| 09/08 | 2 | 1729 | 1737 | 1850 | 1912 | 1.47 | 1.36 | Twilight |
| 08/25 | 1 | 1901 | 1908 | 2000 | 2018 | 1.08 | 0.93 | Twilight |
| 09/14 | 2 | 1824 | 1833 | 2052 | 2123 | 2.65 | 0.75 | Twilight |
| 09/07 | 6 | 1906 | 1914 | 2102 | 2127 | 2.08 | 2.89 | Twilight |
| 09/08 | 10 | 1918 | 1925 | 2139 | 2204 | 2.50 | 4.00 | Twilight |
| 09/15 | 5 | 2133 | 2147 | 2319 | 2338 | 1.81 | 2.76 | Dark |
| 09/14 | 4 | 2126 | 2137 | 2259 | 2321 | 1.64 | 2.44 | Dark |
| 09/07 | 2 | 2127 | 2138 | 2308 | 2330 | 1.78 | 1.13 | Dark |
| Totals | 412 | | | | 121.54 | | | |

Appendix B.—Chum salmon catches, time of sets, hours fished, CPUE (chum/h), ambient light phase and date of sets by fishing location and time for the 1988 Clarence Strait experimental fishing.

| Date | Chum Catch | Start Net Out | Net Full Out | Start Net In | Net Full In | Fishing Time (Hours) | CPUE | Ambient Light Phase |
|-----------------|---------------|------------------|-----------------|-----------------|----------------|----------------------------|-------|---------------------------|
| ONSHORE: | | | | | | | | |
| 09/02 | 7 | 0326 | 0338 | 0548 | 0613 | 2.48 | 2.83 | Twilight |
| 08/26 | 2 | 0455 | 0503 | 0536 | 0600 | 0.82 | 2.45 | Twilight |
| 09/07 | 4 | 0407 | 0432 | 0632 | 0701 | 2.45 | 1.63 | Twilight |
| 09/02 | 4 | 0611 | 0619 | 0740 | 0756 | 1.55 | 2.58 | Daylight |
| 08/26 | 6 | 0623 | 0632 | 0745 | 0752 | 1.35 | 4.44 | Daylight |
| 09/07 | 2 | 0705 | 0732 | 0800 | 0815 | 0.82 | 2.45 | Daylight |
| 09/16 | 17 | 0713 | 0721 | 0916 | 0954 | 2.30 | 7.39 | Daylight |
| 08/26 | 14 | 0755 | 0803 | 0941 | 1008 | 1.93 | 7.27 | Daylight |
| 09/02 | 21 | 0812 | 0822 | 0931 | 1000 | 1.48 | 14.24 | Daylight |
| 08/24 | 3 | 0813 | 0819 | 0924 | 0940 | 1.27 | 2.37 | Daylight |
| 09/14 | 3 | 0805 | 0820 | 1033 | 1100 | 2.57 | 1.17 | Daylight |
| 09/07 | 24 | 0825 | 0840 | 1035 | 1105 | 2.29 | 10.47 | Daylight |
| 09/15 | 21 | 1003 | 1010 | 1150 | 1215 | 1.93 | 10.86 | Daylight |
| 09/02 | 5 | 1008 | 1016 | 1142 | 1210 | 1.73 | 2.88 | Daylight |
| 08/24 | 2 | 1014 | 1022 | 1137 | 1152 | 1.44 | 1.39 | Daylight |
| 09/07 | 24 | 1110 | 1118 | 1230 | 1305 | 1.56 | 15.40 | Daylight |
| 09/02 | 6 | 1201 | 1211 | 1319 | 1337 | 1.37 | 4.39 | Daylight |
| 09/16 | 18 | 1217 | 1225 | 1457 | 1527 | 2.85 | 6.32 | Daylight |
| 08/24 | 16 | 1224 | 1233 | 1435 | 1508 | 2.38 | 6.71 | Daylight |
| 09/02 | 8 | 1346 | 1354 | 1455 | 1512 | 1.23 | 6.53 | Daylight |
| 08/24 | 6 | 1515 | 1520 | 1715 | 1737 | 2.14 | 2.80 | Daylight |
| 09/16 | 23 | 1525 | 1532 | 1652 | 1719 | 1.62 | 14.23 | Daylight |
| 09/02 | 8 | 1530 | 1537 | 1705 | 1727 | 1.71 | 4.68 | Daylight |
| 09/14 | 28 | 1532 | 1540 | 1730 | 1813 | 2.26 | 12.40 | Daylight |
| 09/07 | 7 | 1617 | 1624 | 1805 | 1832 | 1.97 | 3.56 | Daylight |
| 09/06 | 5 | 1730 | 1734 | 1957 | 2019 | 2.60 | 1.92 | Twilight |
| 09/01 | 4 | 1805 | 1825 | 2010 | 2040 | 2.17 | 1.85 | Twilight |
| 08/24 | 5 | 1836 | 1843 | 1958 | 2016 | 1.46 | 3.43 | Twilight |
| 08/25 | 12 | 1825 | 1845 | 2055 | 2130 | 2.63 | 4.57 | Twilight |
| 09/15 | 24 | 1837 | 1850 | 2043 | 2121 | 2.31 | 10.40 | Twilight |
| 08/30 | 0 | 2029 | 2037 | 2052 | 2111 | 0.48 | 0.00 | Twilight |
| 09/01 | 13 | 2023 | 2032 | 2215 | 2245 | 2.04 | 6.37 | Twilight |
| 08/24 | 7 | 2025 | 2033 | 2152 | 2216 | 1.58 | 4.42 | Twilight |
| 09/06 | 6 | 2045 | 2110 | 2235 | 2305 | 1.88 | 3.20 | Dark |
| 08/30 | 11 | 2137 | 2152 | 2328 | 2402 | 2.01 | 5.48 | Dark |
| 08/24 | 6 | 2220 | 2228 | 2329 | 2351 | 1.27 | 4.74 | Dark |
| 09/01 | 10 | 2254 | 2303 | 2340 | 2400 | 0.86 | 11.65 | Dark |
| 9/06 | 2 | 2315 | 2330 | 2435 | 2500 | 1.42 | 1.41 | Dark |
| OFSHORE: | | | | | | | | |
| 08/25 | 12 | 0317 | 0332 | 0523 | 0600 | 2.28 | 5.26 | Twilight |
| 09/15 | 18 | 0342 | 0405 | 0644 | 0722 | 3.16 | 5.70 | Twilight |
| 09/16 | 13 | 0345 | 0404 | 0640 | 0704 | 2.96 | 4.39 | Twilight |
| 09/08 | 16 | 0350 | 0407 | 0630 | 0657 | 2.75 | 5.82 | Twilight |
| 09/09 | 17 | 0403 | 0417 | 0650 | 0725 | 2.96 | 5.75 | Twilight |
| 08/25 | 7 | 0606 | 0613 | 0807 | 0852 | 2.33 | 3.00 | Daylight |
| 09/09 | 23 | 0707 | 0718 | 0921 | 1001 | 2.48 | 9.29 | Daylight |
| 09/15 | 7 | 0728 | 0735 | 0930 | 1000 | 2.23 | 3.15 | Daylight |
| 09/08 | 11 | 0732 | 0749 | 0955 | 1023 | 2.48 | 4.44 | Daylight |
| 08/25 | 4 | 0852 | 0900 | 1050 | 1108 | 2.05 | 1.95 | Daylight |
| 09/16 | 7 | 1000 | 1009 | 1153 | 1217 | 2.01 | 3.49 | Daylight |
| 09/09 | 10 | 1008 | 1015 | 1201 | 1229 | 2.06 | 4.86 | Daylight |
| 08/25 | 4 | 1108 | 1117 | 1253 | 1309 | 1.81 | 2.21 | Daylight |
| 09/14 | 2 | 1110 | 1128 | 1237 | 1254 | 1.44 | 1.39 | Daylight |
| 09/15 | 3 | 1216 | 1223 | 1343 | 1402 | 1.55 | 1.94 | Daylight |
| 09/09 | 7 | 1230 | 1238 | 1353 | 1423 | 1.57 | 4.47 | Daylight |
| 09/14 | 14 | 1256 | 1304 | 1458 | 1527 | 2.21 | 6.34 | Daylight |
| 09/08 | 5 | 1729 | 1737 | 1850 | 1912 | 1.47 | 3.41 | Twilight |
| 08/25 | 4 | 1901 | 1908 | 2000 | 2018 | 1.08 | 3.72 | Twilight |
| 09/14 | 8 | 1824 | 1833 | 2052 | 2123 | 2.65 | 3.02 | Twilight |
| 09/07 | 3 | 1906 | 1914 | 2102 | 2127 | 2.08 | 1.45 | Twilight |
| 09/08 | 4 | 1918 | 1925 | 2139 | 2204 | 2.50 | 1.60 | Twilight |
| 09/15 | 8 | 2126 | 2137 | 2259 | 2321 | 1.64 | 4.87 | Dark |
| 09/14 | 6 | 2127 | 2138 | 2308 | 2330 | 1.78 | 3.38 | Dark |
| 09/07 | 1 | 2133 | 2147 | 2319 | 2338 | 1.81 | 0.55 | Dark |
| Totals | 598 | | | | | 121.54 | | |

Appendix C.—Coho salmon catches, time of sets, hours fished, CPUE (coho/h), ambient light phase and date of sets for the 1989 Clarence Strait gill net experimental fishing.

| Date | Coho Catch | Start Net Out | Net Full Out | Start Net In | Net Full In | Fishing Time (Hours) | CPUE | Ambient Light Phase |
|-------|------------|---------------|--------------|--------------|-------------|----------------------|-------|---------------------|
| 09/02 | 3 | 0002 | 0012 | 0109 | 0121 | 1.13 | 2.65 | Dark |
| 08/17 | 0 | 0003 | 0010 | 0059 | 0117 | 1.03 | 0.00 | Dark |
| 08/25 | 19 | 0003 | 0013 | 0103 | 0202 | 1.41 | 13.49 | Dark |
| 08/26 | 4 | 0003 | 0013 | 0103 | 0202 | 1.41 | 2.84 | Dark |
| 08/24 | 4 | 0003 | 0015 | 0103 | 0140 | 1.21 | 3.31 | Dark |
| 09/12 | 1 | 0005 | 0014 | 0118 | 0129 | 1.23 | 0.81 | Dark |
| 08/31 | 2 | 0012 | 0025 | 0113 | 0131 | 1.06 | 1.89 | Dark |
| 09/01 | 1 | 0051 | 0100 | 0147 | 0158 | 0.95 | 1.05 | Dark |
| 09/15 | 12 | 0055 | 0106 | 0203 | 0239 | 1.34 | 8.94 | Dark |
| 08/17 | 1 | 0120 | 0130 | 0205 | 0222 | 0.81 | 1.24 | Dark |
| 09/14 | 3 | 0125 | 0135 | 0229 | 0224 | 0.94 | 3.19 | Dark |
| 09/12 | 0 | 0133 | 0142 | 0230 | 0240 | 0.96 | 0.00 | Dark |
| 09/02 | 0 | 0135 | 0147 | 0245 | 0258 | 1.18 | 0.00 | Dark |
| 08/18 | 0 | 0140 | 0150 | 0227 | 0247 | 0.87 | 0.00 | Dark |
| 08/31 | 2 | 0143 | 0153 | 0243 | 0302 | 1.08 | 1.86 | Dark |
| 08/24 | 4 | 0147 | 0158 | 0244 | 0315 | 1.12 | 3.58 | Dark |
| 08/18 | 5 | 0152 | 0202 | 0232 | 0305 | 0.86 | 5.83 | Dark |
| 09/01 | 2 | 0201 | 0209 | 0259 | 0313 | 1.02 | 1.97 | Dark |
| 09/12 | 0 | 0244 | 0253 | 0346 | 0402 | 1.09 | 0.00 | Dark |
| 09/14 | 0 | 0248 | 0257 | 0346 | 0354 | 0.96 | 0.00 | Dark |
| 09/15 | 3 | 0251 | 0302 | 0347 | 0400 | 0.95 | 3.16 | Dark |
| 09/13 | 4 | 2153 | 2204 | 2257 | 2310 | 1.08 | 3.69 | Dark |
| 09/14 | 5 | 2156 | 2207 | 2304 | 2323 | 1.20 | 4.17 | Dark |
| 08/31 | 0 | 2231 | 2241 | 2324 | 2332 | 0.87 | 0.00 | Dark |
| 09/01 | 1 | 2239 | 2249 | 2339 | 2351 | 1.02 | 0.98 | Dark |
| 09/13 | 24 | 2326 | 2335 | 2427 | 2515 | 1.34 | 17.89 | Dark |
| 09/14 | 7 | 2329 | 2340 | 2425 | 2443 | 0.99 | 7.06 | Dark |
| 08/31 | 2 | 2337 | 2346 | 2433 | 2448 | 0.98 | 2.03 | Dark |
| 08/17 | 8 | 2338 | 2349 | 2500 | 2540 | 1.61 | 4.97 | Dark |
| 08/18 | 5 | 2348 | 2358 | 2457 | 2526 | 1.31 | 3.82 | Dark |
| 08/17 | 0 | 0251 | 0259 | 0348 | 0412 | 1.08 | 0.00 | Twilight |
| 08/19 | 1 | 0253 | 0302 | 0355 | 0433 | 1.28 | 0.78 | Twilight |
| 08/18 | 0 | 0314 | 0326 | 0410 | 0425 | 0.96 | 0.00 | Twilight |
| 08/26 | 4 | 0331 | 0341 | 0431 | 0500 | 1.16 | 3.45 | Twilight |
| 08/25 | 8 | 0332 | 0340 | 0431 | 0501 | 1.17 | 6.86 | Twilight |
| 09/01 | 1 | 0337 | 0346 | 0438 | 0500 | 1.13 | 0.89 | Twilight |
| 08/31 | 0 | 0337 | 0345 | 0432 | 0447 | 0.98 | 0.00 | Twilight |
| 08/24 | 4 | 0400 | 0409 | 0504 | 0523 | 1.15 | 3.48 | Twilight |
| 08/17 | 1 | 0413 | 0423 | 0512 | 0535 | 1.09 | 0.92 | Twilight |
| 09/15 | 1 | 0417 | 0429 | 0513 | 0525 | 0.93 | 1.07 | Twilight |
| 09/12 | 1 | 0421 | 0432 | 0516 | 0526 | 0.91 | 1.10 | Twilight |
| 08/18 | 2 | 0434 | 0444 | 0520 | 0536 | 0.82 | 2.45 | Twilight |
| 08/19 | 1 | 0442 | 0452 | 0530 | 0550 | 0.88 | 1.13 | Twilight |
| 08/31 | 4 | 0454 | 0502 | 0540 | 0558 | 0.85 | 4.71 | Twilight |
| 09/15 | 4 | 0533 | 0543 | 0619 | 0631 | 0.78 | 5.11 | Twilight |
| 09/13 | 16 | 0535 | 0546 | 0615 | 0656 | 0.92 | 17.45 | Twilight |
| 08/25 | 4 | 1023 | 1031 | 1121 | 1147 | 1.12 | 3.58 | Twilight |
| 09/13 | 3 | 1930 | 1929 | 2028 | 2042 | 1.09 | 2.75 | Twilight |
| 09/14 | 5 | 1930 | 1943 | 2030 | 2045 | 1.02 | 4.92 | Twilight |
| 08/31 | 4 | 1946 | 1954 | 2048 | 2106 | 1.12 | 3.58 | Twilight |
| 09/01 | 9 | 2007 | 2017 | 2107 | 2132 | 1.13 | 8.00 | Twilight |
| 08/25 | 12 | 2033 | 2041 | 2119 | 2211 | 1.13 | 10.59 | Twilight |
| 08/24 | 40 | 2041 | 2053 | 2138 | 2301 | 1.54 | 25.95 | Twilight |
| 09/13 | 2 | 2044 | 2053 | 2123 | 2135 | 0.68 | 2.96 | Twilight |
| 08/17 | 4 | 2050 | 2104 | 2157 | 2236 | 1.33 | 3.02 | Twilight |
| 08/18 | 6 | 2050 | 2059 | 2150 | 2222 | 1.19 | 5.03 | Twilight |
| 09/14 | 9 | 2053 | 2103 | 2128 | 2143 | 0.63 | 14.40 | Twilight |
| 08/31 | 1 | 2113 | 2121 | 2158 | 2210 | 0.78 | 1.28 | Twilight |
| 09/01 | 0 | 2137 | 2145 | 2202 | 2211 | 0.43 | 0.00 | Twilight |
| 08/25 | 4 | 2221 | 2232 | 2313 | 2345 | 1.04 | 3.84 | Twilight |
| 08/18 | 2 | 2233 | 2243 | 2318 | 2339 | 0.84 | 2.38 | Twilight |
| 08/17 | 4 | 0548 | 0558 | 0652 | 0725 | 1.26 | 3.18 | Daylight |
| 08/19 | 3 | 0555 | 0606 | 0703 | 0724 | 1.22 | 2.47 | Daylight |
| 08/24 | 0 | 0601 | 0611 | 0702 | 0713 | 1.03 | 0.00 | Daylight |
| 08/31 | 6 | 0605 | 0613 | 0702 | 0723 | 1.06 | 5.67 | Daylight |
| 08/26 | 1 | 0608 | 0618 | 0708 | 0725 | 1.06 | 0.94 | Daylight |

- Continued -

Appendix C.—page 2 of 2.

| Date | Coho Catch | Start Net Out | Net Full Out | Start Net In | Net Full In | Fishing Time (Hours) | CPUE | Ambient Light Phase |
|--------|---------------|------------------|-----------------|-----------------|----------------|----------------------------|------|---------------------------|
| 09/13 | 9 | 0704 | 0716 | 0804 | 0829 | 1.11 | 8.12 | Daylight |
| 08/24 | 4 | 0719 | 0728 | 0816 | 0838 | 1.06 | 3.78 | Daylight |
| 08/31 | 4 | 0729 | 0740 | 0829 | 0900 | 1.17 | 3.43 | Daylight |
| 08/17 | 0 | 0735 | 0743 | 0834 | 0844 | 1.00 | 0.00 | Daylight |
| 08/19 | 1 | 0740 | 0752 | 0904 | 0926 | 1.48 | 0.67 | Daylight |
| 09/13 | 3 | 0833 | 0842 | 0929 | 0945 | 0.99 | 3.03 | Daylight |
| 08/24 | 5 | 0842 | 0852 | 0945 | 1006 | 1.14 | 4.38 | Daylight |
| 08/17 | 0 | 0848 | 0856 | 0945 | 1004 | 1.04 | 0.00 | Daylight |
| 08/31 | 0 | 0907 | 0916 | 1008 | 1033 | 1.15 | 0.00 | Daylight |
| 08/19 | 2 | 0945 | 0954 | 1037 | 1057 | 0.96 | 2.09 | Daylight |
| 09/13 | 2 | 0951 | 1001 | 1049 | 1106 | 1.03 | 1.95 | Daylight |
| 09/14 | 0 | 0958 | 1007 | 1056 | 1112 | 1.03 | 0.00 | Daylight |
| 09/01 | 6 | 0959 | 1010 | 1104 | 1123 | 1.15 | 5.22 | Daylight |
| 08/24 | 3 | 1012 | 1022 | 1114 | 1153 | 1.28 | 2.35 | Daylight |
| 08/17 | 3 | 1016 | 1028 | 1123 | 1142 | 1.18 | 2.55 | Daylight |
| 08/31 | 4 | 1035 | 1044 | 1134 | 1153 | 1.07 | 3.75 | Daylight |
| 08/18 | 0 | 1058 | 1108 | 1150 | 1212 | 0.97 | 0.00 | Daylight |
| 09/01 | 2 | 1128 | 1136 | 1226 | 1238 | 1.00 | 2.00 | Daylight |
| 09/14 | 2 | 1128 | 1137 | 1222 | 1241 | 0.98 | 2.03 | Daylight |
| 08/25 | 3 | 1150 | 1158 | 1244 | 1307 | 1.03 | 2.93 | Daylight |
| 08/18 | 3 | 1215 | 1227 | 1306 | 1320 | 0.87 | 3.46 | Daylight |
| 09/01 | 1 | 1246 | 1256 | 1346 | 1354 | 0.98 | 1.02 | Daylight |
| 09/14 | 5 | 1247 | 1258 | 1346 | 1407 | 1.07 | 4.69 | Daylight |
| 08/25 | 1 | 1310 | 1318 | 1404 | 1419 | 0.96 | 1.04 | Daylight |
| 09/01 | 9 | 1702 | 1710 | 1800 | 1828 | 1.13 | 7.94 | Daylight |
| 09/14 | 2 | 1702 | 1710 | 1755 | 1809 | 0.93 | 2.14 | Daylight |
| 09/13 | 8 | 1705 | 1714 | 1803 | 1828 | 1.10 | 7.27 | Daylight |
| 08/25 | 1 | 1712 | 1719 | 1804 | 1814 | 0.89 | 1.12 | Daylight |
| 08/24 | 7 | 1801 | 1814 | 1903 | 1929 | 1.14 | 6.13 | Daylight |
| 08/31 | 0 | 1803 | 1813 | 1904 | 1923 | 1.09 | 0.00 | Daylight |
| 08/17 | 0 | 1805 | 1815 | 1908 | 1949 | 1.31 | 0.00 | Daylight |
| 09/14 | 5 | 1816 | 1826 | 1903 | 1919 | 0.83 | 6.00 | Daylight |
| 08/25 | 1 | 1819 | 1828 | 1926 | 1946 | 1.21 | 0.83 | Daylight |
| 09/01 | 4 | 1830 | 1841 | 1932 | 1957 | 1.15 | 3.48 | Daylight |
| 09/13 | 2 | 1835 | 1846 | 1910 | 1920 | 0.58 | 3.48 | Daylight |
| 08/17 | 1 | 2002 | 2012 | 2030 | 2047 | 0.53 | 1.90 | Daylight |
| Totals | 392 | | | | | 107.28 | | |

Appendix D.—Chum salmon catches, time of sets, hours fished, CPUE (chum/h), ambient light phase and date of sets for the 1989 Clarence Strait gill net experimental fishing.

| Date | Catch | Start Net Out | Net Full Out | Start Net In | Net Full In | Fishing Time (Hours) | CPUE | Ambient Light Phase |
|-------|-------|---------------|--------------|--------------|-------------|----------------------|-------|---------------------|
| 09/02 | 0 | 0002 | 0012 | 0109 | 0121 | 1.13 | 0.00 | Dark |
| 08/24 | 3 | 0003 | 0015 | 0103 | 0140 | 1.21 | 2.48 | Dark |
| 08/17 | 4 | 0003 | 0010 | 0059 | 0117 | 1.03 | 3.90 | Dark |
| 08/25 | 8 | 0003 | 0013 | 0103 | 0202 | 1.41 | 5.68 | Dark |
| 08/26 | 5 | 0003 | 0013 | 0103 | 0202 | 1.41 | 3.55 | Dark |
| 09/12 | 0 | 0005 | 0014 | 0118 | 0129 | 1.23 | 0.00 | Dark |
| 08/31 | 0 | 0012 | 0025 | 0113 | 0131 | 1.06 | 0.00 | Dark |
| 09/01 | 1 | 0051 | 0100 | 0147 | 0158 | 0.95 | 1.05 | Dark |
| 09/15 | 9 | 0055 | 0106 | 0203 | 0239 | 1.34 | 6.71 | Dark |
| 08/17 | 1 | 0120 | 0130 | 0205 | 0222 | 0.81 | 1.24 | Dark |
| 09/14 | 1 | 0125 | 0135 | 0229 | 0224 | 0.94 | 1.06 | Dark |
| 09/12 | 1 | 0133 | 0142 | 0230 | 0240 | 0.96 | 1.04 | Dark |
| 09/02 | 1 | 0135 | 0147 | 0245 | 0258 | 1.18 | 0.85 | Dark |
| 08/18 | 1 | 0140 | 0150 | 0227 | 0247 | 0.87 | 1.15 | Dark |
| 08/31 | 2 | 0143 | 0153 | 0243 | 0302 | 1.08 | 1.86 | Dark |
| 08/24 | 2 | 0147 | 0158 | 0244 | 0315 | 1.12 | 1.79 | Dark |
| 08/18 | 8 | 0152 | 0202 | 0232 | 0305 | 0.86 | 9.32 | Dark |
| 09/01 | 0 | 0201 | 0209 | 0259 | 0313 | 1.02 | 0.00 | Dark |
| 09/12 | 0 | 0244 | 0253 | 0346 | 0402 | 1.09 | 0.00 | Dark |
| 09/14 | 0 | 0248 | 0257 | 0346 | 0354 | 0.96 | 0.00 | Dark |
| 09/15 | 2 | 0251 | 0302 | 0347 | 0400 | 0.95 | 2.11 | Dark |
| 09/13 | 0 | 2153 | 2204 | 2257 | 2310 | 1.08 | 0.00 | Dark |
| 09/14 | 1 | 2156 | 2207 | 2304 | 2323 | 1.20 | 0.83 | Dark |
| 08/31 | 0 | 2231 | 2241 | 2324 | 2332 | 0.87 | 0.00 | Dark |
| 09/01 | 0 | 2239 | 2249 | 2339 | 2351 | 1.02 | 0.00 | Dark |
| 09/13 | 13 | 2326 | 2335 | 2427 | 2515 | 1.34 | 9.69 | Dark |
| 09/14 | 3 | 2329 | 2340 | 2425 | 2443 | 0.99 | 3.03 | Dark |
| 08/31 | 0 | 2337 | 2346 | 2433 | 2448 | 0.98 | 0.00 | Dark |
| 08/17 | 10 | 2338 | 2349 | 2500 | 2540 | 1.61 | 6.22 | Dark |
| 08/18 | 3 | 2348 | 2358 | 2457 | 2526 | 1.31 | 2.29 | Dark |
| 08/17 | 4 | 0251 | 0259 | 0348 | 0412 | 1.08 | 3.69 | Twilight |
| 08/19 | 6 | 0253 | 0302 | 0355 | 0433 | 1.28 | 4.71 | Twilight |
| 08/18 | 0 | 0314 | 0326 | 0410 | 0425 | 0.96 | 0.00 | Twilight |
| 08/26 | 4 | 0331 | 0341 | 0431 | 0500 | 1.16 | 3.45 | Twilight |
| 08/25 | 4 | 0332 | 0340 | 0431 | 0501 | 1.17 | 3.43 | Twilight |
| 09/01 | 3 | 0337 | 0346 | 0438 | 0500 | 1.13 | 2.67 | Twilight |
| 08/31 | 0 | 0337 | 0345 | 0432 | 0447 | 0.98 | 0.00 | Twilight |
| 08/24 | 3 | 0400 | 0409 | 0504 | 0523 | 1.15 | 2.61 | Twilight |
| 08/17 | 5 | 0413 | 0423 | 0512 | 0535 | 1.09 | 4.58 | Twilight |
| 09/15 | 2 | 0417 | 0429 | 0513 | 0525 | 0.93 | 2.14 | Twilight |
| 09/12 | 0 | 0421 | 0432 | 0516 | 0526 | 0.91 | 0.00 | Twilight |
| 08/18 | 1 | 0434 | 0444 | 0520 | 0536 | 0.82 | 1.22 | Twilight |
| 08/19 | 3 | 0442 | 0452 | 0530 | 0550 | 0.88 | 3.40 | Twilight |
| 08/31 | 6 | 0454 | 0502 | 0540 | 0558 | 0.85 | 7.06 | Twilight |
| 09/15 | 2 | 0533 | 0543 | 0619 | 0631 | 0.78 | 2.55 | Twilight |
| 09/13 | 12 | 0535 | 0546 | 0615 | 0656 | 0.92 | 13.09 | Twilight |
| 08/25 | 9 | 1023 | 1031 | 1121 | 1147 | 1.12 | 8.06 | Twilight |
| 09/14 | 0 | 1930 | 1943 | 2030 | 2045 | 1.02 | 0.00 | Twilight |
| 09/13 | 1 | 1930 | 1929 | 2028 | 2042 | 1.09 | 0.92 | Twilight |
| 08/31 | 1 | 1946 | 1954 | 2048 | 2106 | 1.12 | 0.90 | Twilight |
| 09/01 | 1 | 2007 | 2017 | 2107 | 2132 | 1.13 | 0.89 | Twilight |
| 08/25 | 9 | 2033 | 2041 | 2119 | 2211 | 1.13 | 7.94 | Twilight |
| 08/24 | 12 | 2041 | 2053 | 2138 | 2301 | 1.54 | 7.78 | Twilight |
| 09/13 | 0 | 2044 | 2053 | 2123 | 2135 | 0.68 | 0.00 | Twilight |
| 08/18 | 5 | 2050 | 2059 | 2150 | 2222 | 1.19 | 4.20 | Twilight |
| 08/17 | 9 | 2050 | 2104 | 2157 | 2236 | 1.33 | 6.79 | Twilight |
| 09/14 | 2 | 2053 | 2103 | 2128 | 2143 | 0.63 | 3.20 | Twilight |
| 08/31 | 1 | 2113 | 2121 | 2158 | 2210 | 0.78 | 1.28 | Twilight |
| 09/01 | 0 | 2137 | 2145 | 2202 | 2211 | 0.43 | 0.00 | Twilight |
| 08/25 | 5 | 2221 | 2232 | 2313 | 2345 | 1.04 | 4.80 | Twilight |
| 08/18 | 2 | 2233 | 2243 | 2318 | 2339 | 0.84 | 2.38 | Twilight |
| 08/17 | 9 | 0548 | 0558 | 0652 | 0725 | 1.26 | 7.15 | Daylight |
| 08/19 | 6 | 0555 | 0606 | 0703 | 0724 | 1.22 | 4.93 | Daylight |
| 08/24 | 3 | 0601 | 0611 | 0702 | 0713 | 1.03 | 2.93 | Daylight |
| 08/31 | 2 | 0605 | 0613 | 0702 | 0723 | 1.06 | 1.89 | Daylight |

- Continued -

Appendix D.—page 2 of 2.

| Date | Catch | Start Net Out | Net Full Out | Start Net In | Net Full In | Fishing Time (Hours) | CPUE | Ambient Light Phase |
|--------|-------|------------------|-----------------|-----------------|----------------|----------------------------|------|---------------------------|
| 08/26 | 4 | 0608 | 0618 | 0708 | 0725 | 1.06 | 3.78 | Daylight |
| 09/13 | 6 | 0704 | 0716 | 0804 | 0829 | 1.11 | 5.41 | Daylight |
| 08/24 | 4 | 0719 | 0728 | 0816 | 0838 | 1.06 | 3.78 | Daylight |
| 08/31 | 8 | 0729 | 0740 | 0829 | 0900 | 1.17 | 6.86 | Daylight |
| 08/17 | 2 | 0735 | 0743 | 0834 | 0844 | 1.00 | 2.00 | Daylight |
| 08/19 | 5 | 0740 | 0752 | 0904 | 0926 | 1.48 | 3.37 | Daylight |
| 09/13 | 2 | 0833 | 0842 | 0929 | 0945 | 0.99 | 2.02 | Daylight |
| 08/24 | 5 | 0842 | 0852 | 0945 | 1006 | 1.14 | 4.38 | Daylight |
| 08/17 | 0 | 0848 | 0856 | 0945 | 1004 | 1.04 | 0.00 | Daylight |
| 08/31 | 8 | 0907 | 0916 | 1008 | 1033 | 1.15 | 6.96 | Daylight |
| 08/19 | 3 | 0945 | 0954 | 1037 | 1057 | 0.96 | 3.13 | Daylight |
| 09/13 | 1 | 0951 | 1001 | 1049 | 1106 | 1.03 | 0.98 | Daylight |
| 09/14 | 0 | 0958 | 1007 | 1056 | 1112 | 1.03 | 0.00 | Daylight |
| 09/01 | 0 | 0959 | 1010 | 1104 | 1123 | 1.15 | 0.00 | Daylight |
| 08/24 | 11 | 1012 | 1022 | 1114 | 1153 | 1.28 | 8.63 | Daylight |
| 08/17 | 1 | 1016 | 1028 | 1123 | 1142 | 1.18 | 0.85 | Daylight |
| 08/31 | 1 | 1035 | 1044 | 1134 | 1153 | 1.07 | 0.94 | Daylight |
| 08/18 | 1 | 1058 | 1108 | 1150 | 1212 | 0.97 | 1.03 | Daylight |
| 09/01 | 0 | 1128 | 1136 | 1226 | 1238 | 1.00 | 0.00 | Daylight |
| 09/14 | 4 | 1128 | 1137 | 1222 | 1241 | 0.98 | 4.07 | Daylight |
| 08/25 | 4 | 1150 | 1158 | 1244 | 1307 | 1.03 | 3.90 | Daylight |
| 08/18 | 0 | 1215 | 1227 | 1306 | 1320 | 0.87 | 0.00 | Daylight |
| 09/01 | 0 | 1246 | 1256 | 1346 | 1354 | 0.98 | 0.00 | Daylight |
| 09/14 | 5 | 1247 | 1258 | 1346 | 1407 | 1.07 | 4.69 | Daylight |
| 08/25 | 2 | 1310 | 1318 | 1404 | 1419 | 0.96 | 2.09 | Daylight |
| 09/01 | 4 | 1702 | 1710 | 1800 | 1828 | 1.13 | 3.53 | Daylight |
| 09/14 | 2 | 1702 | 1710 | 1755 | 1809 | 0.93 | 2.14 | Daylight |
| 09/13 | 3 | 1705 | 1714 | 1803 | 1828 | 1.10 | 2.73 | Daylight |
| 08/25 | 1 | 1712 | 1719 | 1804 | 1814 | 0.89 | 1.12 | Daylight |
| 08/24 | 4 | 1801 | 1814 | 1903 | 1929 | 1.14 | 3.50 | Daylight |
| 08/31 | 4 | 1803 | 1813 | 1904 | 1923 | 1.09 | 3.66 | Daylight |
| 08/17 | 8 | 1805 | 1815 | 1908 | 1949 | 1.31 | 6.11 | Daylight |
| 09/14 | 2 | 1816 | 1826 | 1903 | 1919 | 0.83 | 2.40 | Daylight |
| 08/25 | 11 | 1819 | 1828 | 1926 | 1946 | 1.21 | 9.10 | Daylight |
| 09/01 | 6 | 1830 | 1841 | 1932 | 1957 | 1.15 | 5.22 | Daylight |
| 09/13 | 1 | 1835 | 1846 | 1910 | 1920 | 0.58 | 1.74 | Daylight |
| 08/17 | 2 | 2002 | 2012 | 2030 | 2047 | 0.53 | 3.81 | Daylight |
| Totals | | 337 | | | | 107.28 | | |